PAINT and VARNISH

THE TECHNICAL MAGAZINE FOR MANUFACTURERS OF PAINT, VARNISH, LACQUER AND OTHER SYNTHETIC FINISHE

FACTS

Every formulator should know

ABOUT EPOXY COATINGS

SEND FOR THIS HANDY, DESCRIPTIVE REFERENCE BOOK

• **Inside are the answers to a great many of the questions you've been asking about epoxy resins. The information includes everything from a comprehensive discussion of epoxy coating fundamentals to suggested formulations for a wide variety of applications. No fancy talk . . . plenty of down-to-earth data . . . the kind of reference material every formulator wants to have at his fingertips. Write for your free copy today.**

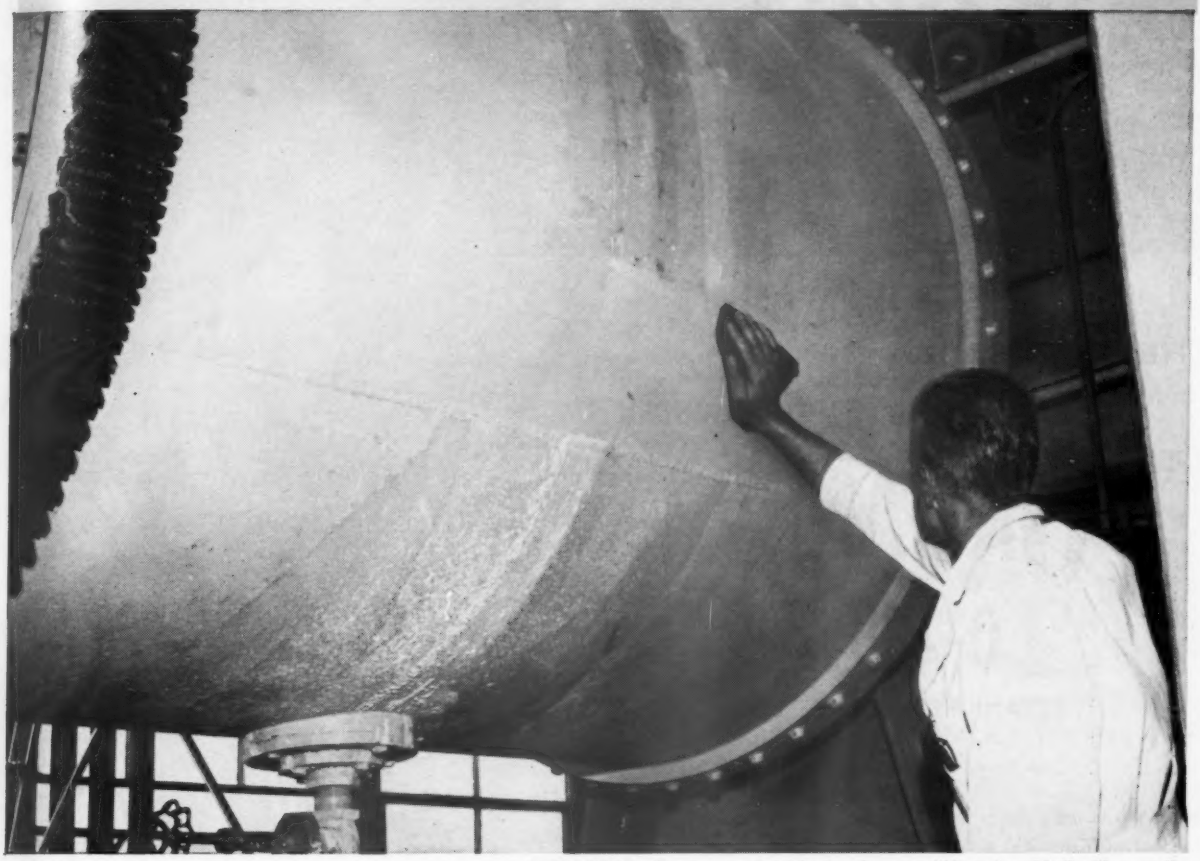
Creative Chemistry . . . Your Partner in Progress

Synthetic Resins • Chemical Colors • Industrial Adhesives • Phenol
Hydrochloric Acid • Formaldehyde • Glycerine • Phthalic Anhydride
Maleic Anhydride • Sebacic Acid • Ortho-Phenylphenol • Sodium Sulfite
Pentaerythritol • Pentachlorophenol • Sodium Pentachlorophenate
Sulfuric Acid • Methanol

REICHHOLD RCI

REICHHOLD CHEMICALS, INC.,
RCI BUILDING, WHITE PLAINS, N.Y.

At The Glidden Company...



At The Glidden Company, paint drippings from a pebble and steel ball mill are easily cleaned off the Epon resin-based exterior surface coating with a solvent-dipped rag.

Chemical-resistant Epon® resin-based coatings guard paint production equipment from corrosion ...greatly reduce maintenance costs

At one of the paint production plants of The Glidden Company, enamel coatings on equipment were often stripped down to bare metal in only 30 days by the corrosive action of caustic cleaners. Maintenance costs were high.

To reduce costs for general housekeeping and repainting, the grinding mills, storage tanks, structural steel, and concrete areas were coated with Glidden's own Epon resin-based paint, Nu-Pon Cote.

Even though the Epon resin-based coatings are constantly exposed to hot caustic soda solutions, solvents, paint splashes, and abrasion, a fast washing down with solutions of petroleum and ester solvents keeps them clean and bright. Equipment is completely free from corrosion. *The Epon resin-based coatings have already lasted 4 times longer than the previous enamels.*

Most paint users are already aware of the many advantages offered by Epon resin formulations . . . excellent adhesion, resistance to abrasion, impact, heat, and humidity extremes.

Your Shell Chemical representative will explain how you can take full advantage of Epon resins in your paint and enamel formulations. Write for EPON RESIN ESTERS FOR SURFACE COATINGS.

SHELL CHEMICAL CORPORATION
PLASTICS AND RESINS DIVISION
CHICAGO • CLEVELAND • LOS ANGELES • NEW YORK
IN CANADA Chemical Division, Shell Oil Company of Canada, Limited, Montreal • Toronto • Vancouver

SHELL


STEP UP
REPEAT SALES OF
YOUR EXTERIOR WHITES
WITH UNITANE®
0-220
TITANIUM DIOXIDE
Lasting whiteness, clean weathering and resistance to yellowing are vital selling properties in exterior white paints... and they're imparted to an outstanding degree by UNITANE O-220. This anatase titanium dioxide is particularly recommended for exterior white house paints, both in conventional and fumeproof formulations.
Whatever your requirements, there's a UNITANE pigment—either anatase or rutile—in a grade exactly right for your formulation. Ask your Cyanamid Pigments representative for details.
CYANAMID
AMERICAN CYANAMID COMPANY
PIGMENTS DIVISION
30 Rockefeller Plaza
New York 20, N. Y.
Branch Offices and Warehouses in Principal Cities
WHITER AND BRIGHTER WITH
UNITANE

PAINT and VARNISH

JOHN POWELL, *Publisher*

ANTHONY ERRICO, *Editor*

ALAN P. DANFORTH
General Manager

ABRAHAM MANN
Production Manager

HOWARD N. SCHWARTZ
Ass't. Editor

W. PHILIP LEIDY
V. SLAMECKA
L. SHATKIN
Editorial Ass'ts.

ROBERT B. ABBOTT
Circulation Manager

PHILIP J. SEAVEY
Advertising Manager

W. A. COOK & ASSOCIATES
161 E. Grand Ave.
Chicago 11, Ill.
WHitehead 4-2260
Midwest Advertising Representatives

McDONALD-THOMPSON
West Coast Advertising Representatives

PAINT and VARNISH PRODUCTION is published monthly except semi-monthly in March at Easton, Pa., by Powell Magazines, Inc., John Powell, president; Ira P. MacNair, vice-president and treasurer; Alice L. Lynch, secretary. Entered as second class matter at Post Office at Easton, Pa., Jan. 30th, 1952, under the Act of March 3, 1879. SUBSCRIPTION RATES POSTPAID: *United States and Canada*, 1 year $4.00; 2 years $7.00. *Mexico and Pan-American Countries*, 1 year $5.00; 2 years $8.00. All other countries, 1 year $8.00; 2 years $15.00. Remit cash in advance, with order, by bankers draft on New York funds. SINGLE COPIES: *Current issue*: $0.50; *all back numbers*: $1.00. Convention issue: $1.00. Bound volumes: $10.00 per vol. when available. We cannot guarantee to supply back numbers and claims for missing numbers cannot be granted if received more than 60 days after date of mailing. Subscribers should promptly notify circulation department of any change in address, giving both old and new addresses and by sending address label. EDITORIAL AND EXECUTIVE OFFICES: 855 Avenue of the Americas, New York 1, N. Y. BRyant 9-0497. Printed in U.S.A.

(REG. U.S. PATENT OFFICE)

Formerly PAINT and VARNISH PRODUCTION MANAGER
(Established in 1910 as The Paint and Varnish Record)

VOL. 49 FEBRUARY, 1959 NO. 2

FEATURES

PRODUCTION

FOREIGN DEVELOPMENTS

DEPARTMENTS

NEXT ISSUE

Our March issue will present a series of articles covering various facets of alkyd resin technology. The series will highlight the current position and future possibilities of alkyds in the coatings field.

ENJAY ETHYL ACETATE

NOW AVAILABLE IN BULK!

Now Enjay adds Ethyl Acetate to the family of Enjay Petrochemicals. This means you can fill your petrochemical requirements from one *source of supply*. The petrochemicals you order from Enjay arrive in different compartments—eliminating the expense of maintaining large bulk tankage. That way *you* save on receiving and storage costs. Next time you need Ethyl Acetate, Methyl Ethyl Ketone or other high purity petrochemicals for your surface coating or chemical requirements be sure to order from Enjay.

For complete information . . . write or telephone our nearest office for specification sheets and product description bulletin.

EXCITING NEW PRODUCTS THROUGH PETRO-CHEMISTRY

ENJAY COMPANY, INC.

15 West 51st Street, New York 19, N. Y.

Akron • Boston • Charlotte • Chicago • Detroit • Los Angeles • New Orleans • Tulsa

ENJAY
PETROCHEMICALS

EDITORIAL COMMENT

Our Aerosol Issue

WITHIN the past year, aerosol spray paints have shown a phenomenal growth. According to figures released by the Chemical Specialties Manufacturers Association, production of pigmented and metallic paints and clear plastic sprays zoomed to 36.5 million cans in 1957. This total production represented an increase of 62% over 1956's 22.5 million cans and estimates are that in 1958 production will reach above 50 million cans.

What is the future of this burgeoning field?

Herbert D. Fine, president of Plasti-Kote in Cleveland, envisions a volume of 100 million cans within the next two to three years.

One of the big reasons for this growth is the consumer acceptance of aerosol paints, particularly by women. Aerosol paints have been found to be a handy touch-up tool in and around the home. As a result, it is replacing the messy half-pint can used for this purpose. In addition, aerosol paints are finding new uses among the professional painters because of the ease with which they perform in hard-to-get-at places.

Another large outlet for aerosol paints is in the maintenance field. The aerosol paint can has become a standard tool in maintenance kits for touching-up chipped soft-drink dispensers, cigarette machines, tractors, automobiles, refrigerators, gasoline pumps, computing machines, etc.

Specialty coating have also found their way into the aerosol can. For example, a finish with moisture and fungus resistant properties is being used extensively by the electronics industry. Even wrinkle finishes are available in the aerosol can.

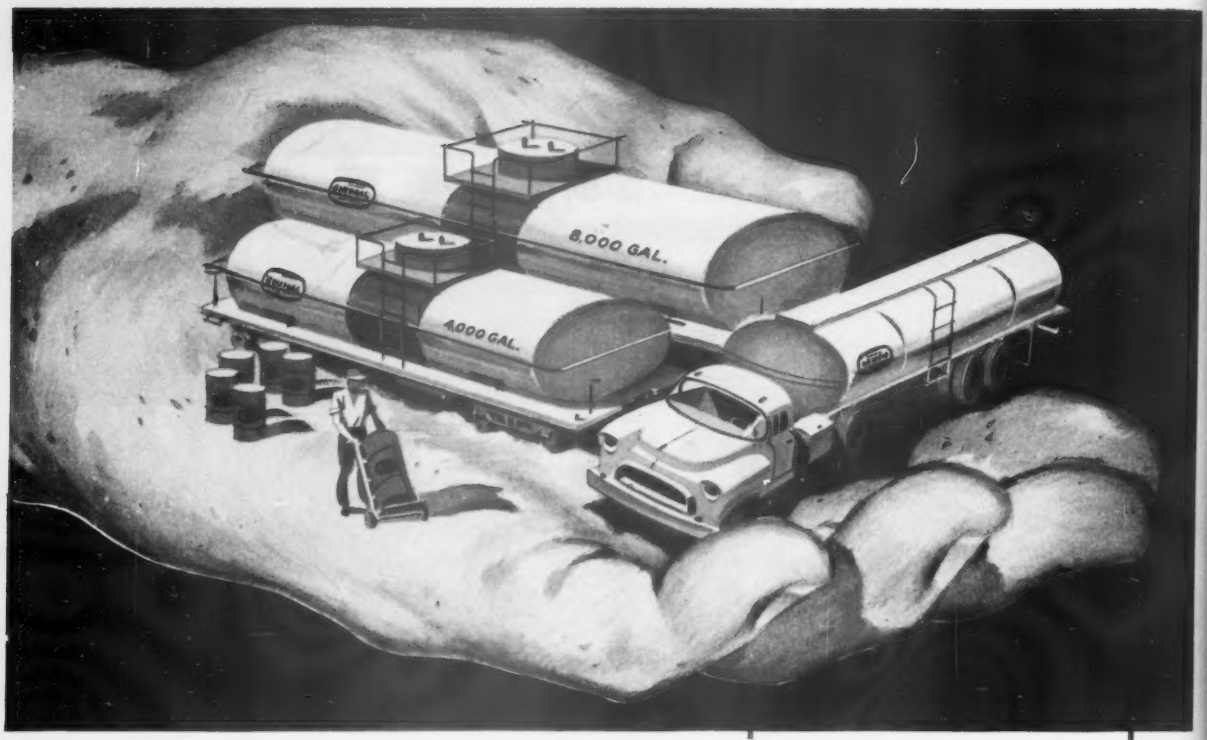
This booming market, while at present represents about 10% of the total volume of paint produced, is an attractive one for paint manufacturers to consider. Aerosol paints are not easy to manufacture. Certain skills and know-how, particularly in packaging are essential in marketing a satisfactory product.

In the interest of those paint manufacturers who contemplate entering this field, PAINT & VARNISH PRODUCTION is pleased to present a comprehensive technical feature on aerosol paints in this issue (page 23) covering formulation, propellants, packaging, and the problems associated with the manufacture of aerosol paints. *We urge you to read it.*

We Thank You

FROM the many letters we received commenting favorably on our editorial, "Prove Me Wrong" (December issue), we are pleased to know that many share our feelings with regard to the lack of interest in the Roon Awards.

These comments were particularly satisfying to us and we sincerely thank all those who took the trouble to drop us a note on this subject. For it is only through the exchange of ideas that something constructive will result which, in this case, is to stimulate more interest in the Roon Awards by members of the Federation.



TO MEET YOUR NEEDS . . .

GEN-FLO® OFFERS BOTH TOP QUALITY AND INDIVIDUALIZED SERVICE

To help you keep latex inventories within reasonable limits, Gen-Flo is available in shipments tailored to fit *your* production requirements. Whether your need is for drum, tank truck, or tank car quantities, Gen-Flo is ready to serve you now!

Gen-Flo, the "balance-controlled" styrene-butadiene latex, comes from an ultra-modern plant, where it is carefully produced and thoroughly tested by skilled technicians to assure the ultimate in quality and uniformity. Prove Gen-Flo's excellence in your own paint formulations — write today for literature and a generous sample of Gen-Flo . . . the latex that *makes* outstanding paints.

FACTS YOU SHOULD KNOW ABOUT GEN-FLO

Available in shipments tailored to your operation, Gen-Flo offers these physical characteristics:

Viscosity—cps.	**—**	**21**
Residual styrene %	**—**	**0.03**
Odor	**—**	**Extremely mild**
Mechanical stability %	**—**	**0.03**
Film specs	**—**	**Good**
Stabilization System		**—Balanced**

THE GENERAL TIRE & RUBBER COMPANY
CHEMICAL DIVISION
AKRON, OHIO

Creating Progress Through Chemistry

Chemical Division GENERAL THE GENERAL TIRE & RUBBER CO. GEN-FLO®

TRIMETHYLOLPROPANE...a fast 10,000,000 lbs. to feed growing industry

The properties of this free-flowing polyol are of prime importance to the fast-growing polyurethane foams industry. Trimethylolpropane's ability to improve both rigid and flexible foams, coupled with its easier processing, offer extremely valuable manufacturing advantages. And in the large alkyd resins industry serving the $1.6 billion paint market, this chemical intermediate is also finding important application.

But, until Celanese developed a method for high-volume, low-cost production, the usefulness of trimethylolpropane was severely limited. Today, a major Celanese production facility at Bishop, Texas, is geared to turn in excess of 10 million pounds, provi industry with a high quality product practical price.

This is another example of how Cela development and production anticipate meet the needs of progressing industries.

Cela

Basic reasons . . . .

Acids
Alcohols
Aldehydes
Anhydrides
Esters

Functional Fluids
Gasoline Additives
Glycols
Ketones
Oxides

Polyols
Plasticizers
Salts
Solvents
Vinyl Monomers

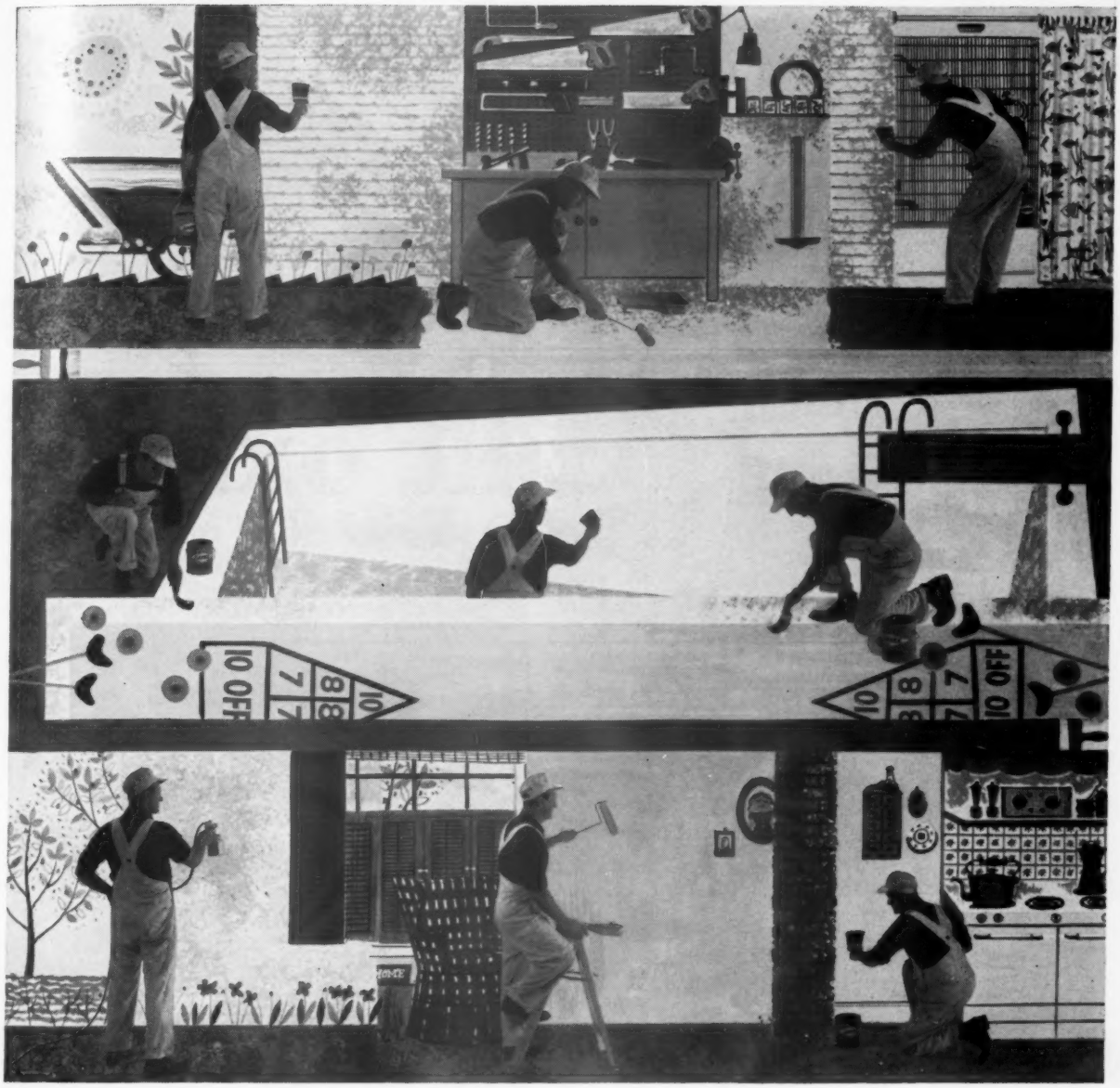
Celanese CHEMICALS

. . . . . for improved products

Agricultural
Automotive
Aviation
Building
Electrical

Paper
Pharmaceutical
Plastics
Surface Coatings
Textiles

CELANESE CORPORATION OF AMERICA, CHEMICAL DIVISION, DEPT. 553-B, 180 MADISON AVE., NEW YORK 16.
EXPORT SALES: AMCEL CO., INC., AND PAN AMCEL CO., INC., 180 MADISON AVE., NEW YORK 16.



For versatility without compromise use Dow Latex

Dow Latex gives you more quality paint mileage . . . because this is the base on which you can build a diversified line of today's finest latex paints without compromising on the quality of any one of the formulations!

Dow Latex is readily compatible with the widest range of modifiers and pigments. Its greater binding power results in higher critical PVC and lower cost *without* sacrificing film integrity.

For interior and exterior applications, paints made with Dow Latex lead the way in new developments in quality latex finishes. The new concrete floor paints, glosses and semi-glosses, exterior masonry paints, latex lawn paints, roof paints, and even some swimming pool paints . . . all are based on Dow Latex.

Make the most of Dow latex for a wider line of fine quality, modern paints. Get the technical information now from

THE DOW CHEMICAL COMPANY,
Coatings Sales Department
2126DL2, Midland, Mich.

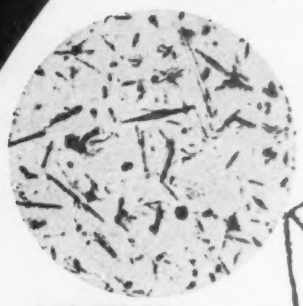
LATEX®

YOU CAN DEPEND ON DOW®

There's an AZO

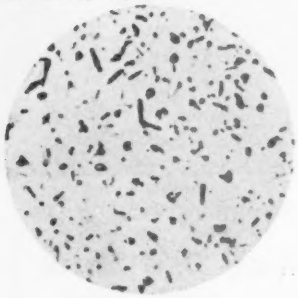
acicular ZINC OXIDE

for the degree of oil absorption you require



AZO ZZZ-22
for high consistency in paints

AZO ZZZ-11
for medium consistency in paints



AZO ZZZ-33
for low consistency in paints

AZO acicular zinc oxides are free from detrimental colloidal fines, produce exceptional weathering properties in exterior paints, and are resistant to hard settling during shelf storage. For general use in the production of paints and enamels.

Whether it's high, medium or low, you'll find there is a particular grade of AZO zinc oxide to meet your needs exactly. And, when necessary, we can select within grades the exact degree of desired oil absorption.

AZO acicular lead-free zinc oxide is a superior pigment that will give extra durability, finer weathering qualities to your paints.

ALL AZO PAINT GRADE ZINC OXIDES AVAILABLE AS AZODOX (De-Aerated)

AZODOX has twice the apparent density, half the dry bulk. Faster handling, easier storing, quicker mixing. Costs no more.

1ST

American Zinc was the first, *and is still the only* producer of acicular lead-free zinc oxides covering a wide range of oil absorptions from high to low *and including the intermediate ranges.*

American Zinc sales company

Distributors for AMERICAN ZINC, LEAD & SMELTING COMPANY
COLUMBUS, OHIO • CHICAGO • ST. LOUIS • NEW YORK

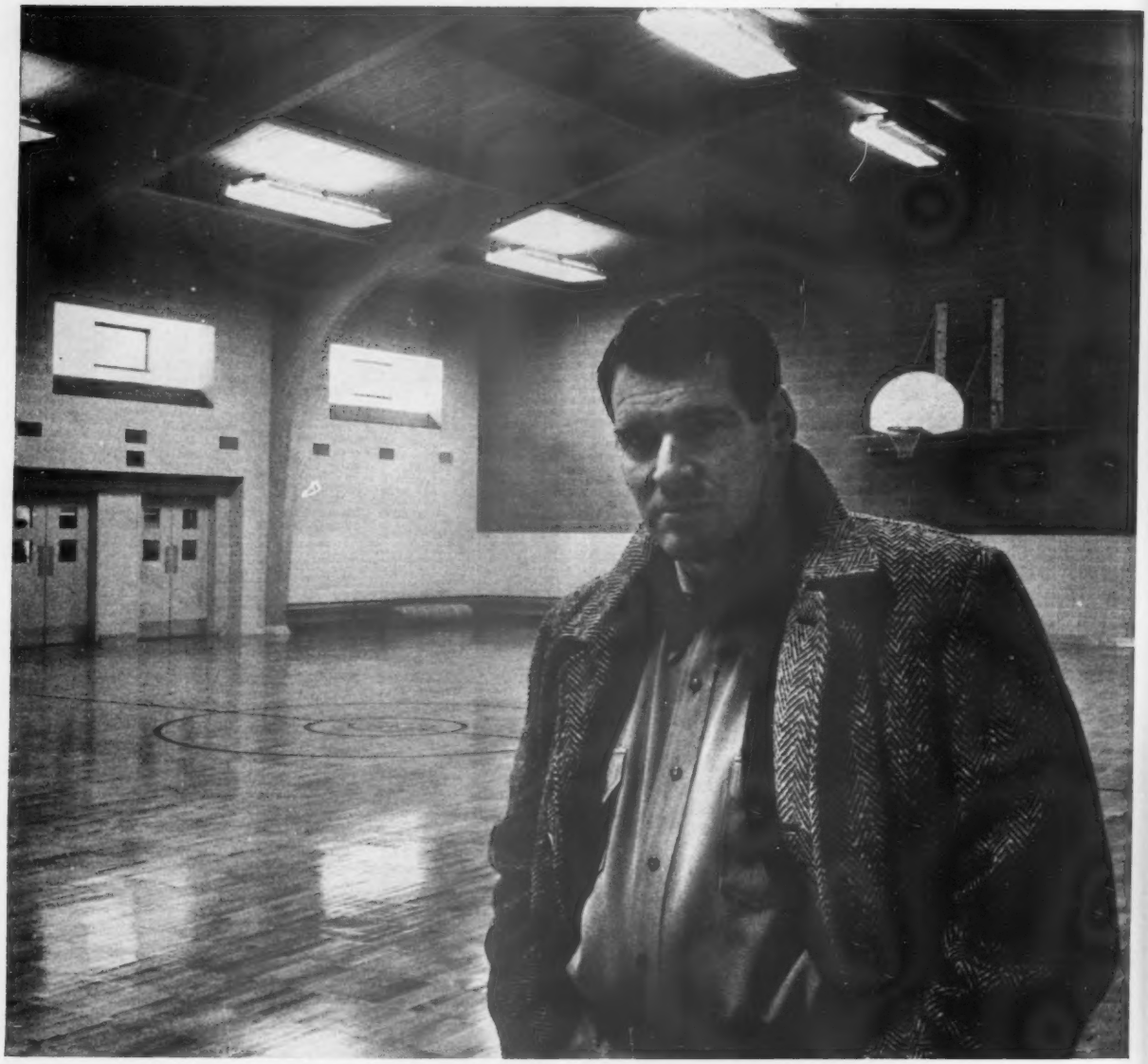
Dow vinyltoluene delivers low color, high gloss, snap dry with any drying oil

No doubt the most significant advantage of Dow vinyltoluene is its ready ability to modify all commercially important drying oils. With any of them—whether dehydrated castor, linseed, safflower, soya, menhaden, cottonseed, coconut or tall oil—Dow vinyltoluene consistently forms useful, sparkling-clear, high-grade and inexpensive vehicles.

This results in a wide choice of excellent vehicles to upgrade your paints and varnishes at less cost. The vehicles provide an unusual balance of properties, combining low color, high gloss and quick drying with better chemical resistance and durability.

For more information on Dow vinyltoluene, contact our nearest sales office. Or write THE DOW CHEMICAL COMPANY, Midland, Michigan, Coatings Sales Dept. 2204DL2.

YOU CAN DEPEND ON DOW



"AFTER HUNDREDS OF APPLICATIONS, CARGILL POLYURETHANE 101 IS THE FINEST FINISH I'VE EVER USED!"

Mr. W. A. Gerrard, Minneapolis Finisher

Checking one of his most recent Cargill Polyurethane 101 applications, Minneapolis Finisher W. A. Gerrard inspects the gymnasium of the new St. Joan of Arc Church, Minneapolis. The finish, applied in August, 1958, is "perfect," says Mr. Gerrard.

"I've been using Cargill Polyurethane 101 for over a year. I've applied it in hundreds of homes and three gymnasiums in different parts of the country. So far it's the best I've ever used. It *works* so much easier . . . gives you *terrific coverage* . . . *stands up* on the floor without soaking in . . . provides a good *top coat* . . . dries rapidly *without lap marks.*

"We are presently including it in all specifications issued to architects in the U. S. and Canada, because—after hundreds of applications—Cargill Polyurethane is the finest finish I've ever used." This is according to Mr. Gerrard, who has been in the floor finishing business for 21 years. Your formulation experience with Polyurethane 101 will be equally satisfactory.

Cargill Polyurethane 101 is a one-package oil modified polyurethane which is stable and provides the solubility, compatability and film forming qualities the paint formulator needs. For specifications, suggested formulations and uses, write:

Cargill, incorporated

200 Grain Exchange, Minneapolis, Minn., Dept. **103**

basic supplier to the coatings industry

this is THE SOLVENTS AND CHEMICALS GROUP

17 "local" sources for fine quality solvents and chemicals

Rigidly controlled quality products from the nation's leading producers meet all production requirements.

From bulk shipments to drum lots . . . The Solvents and Chemicals Group can meet any volume requirement.

Often, you can save by combining drum orders or by using our compartmented transports for multi-product orders.

Ample, on-the-spot warehousing facilities mean faster delivery . . . less worrysome detail in production planning.

"Dynamic Service" implies a vigorous, energetic, helpful approach to the solution of your procurement problems. By supplying exactly this type of "dynamic" service, The Solvents and Chemicals Group, in just over thirty years, has compiled an amazing record of growth which today embraces 17 plants in 17 cities . . . a fleet of modern tank trucks and packaged product vans . . . and a well trained sales-service staff. These are but a few of the physical "assets" which make The Solvents and Chemicals Group a valued and reliable source for a wide variety of industrial solvents and chemicals.

Our business continues to expand because customers have found this efficient, dependable service a major help in complicated production scheduling.

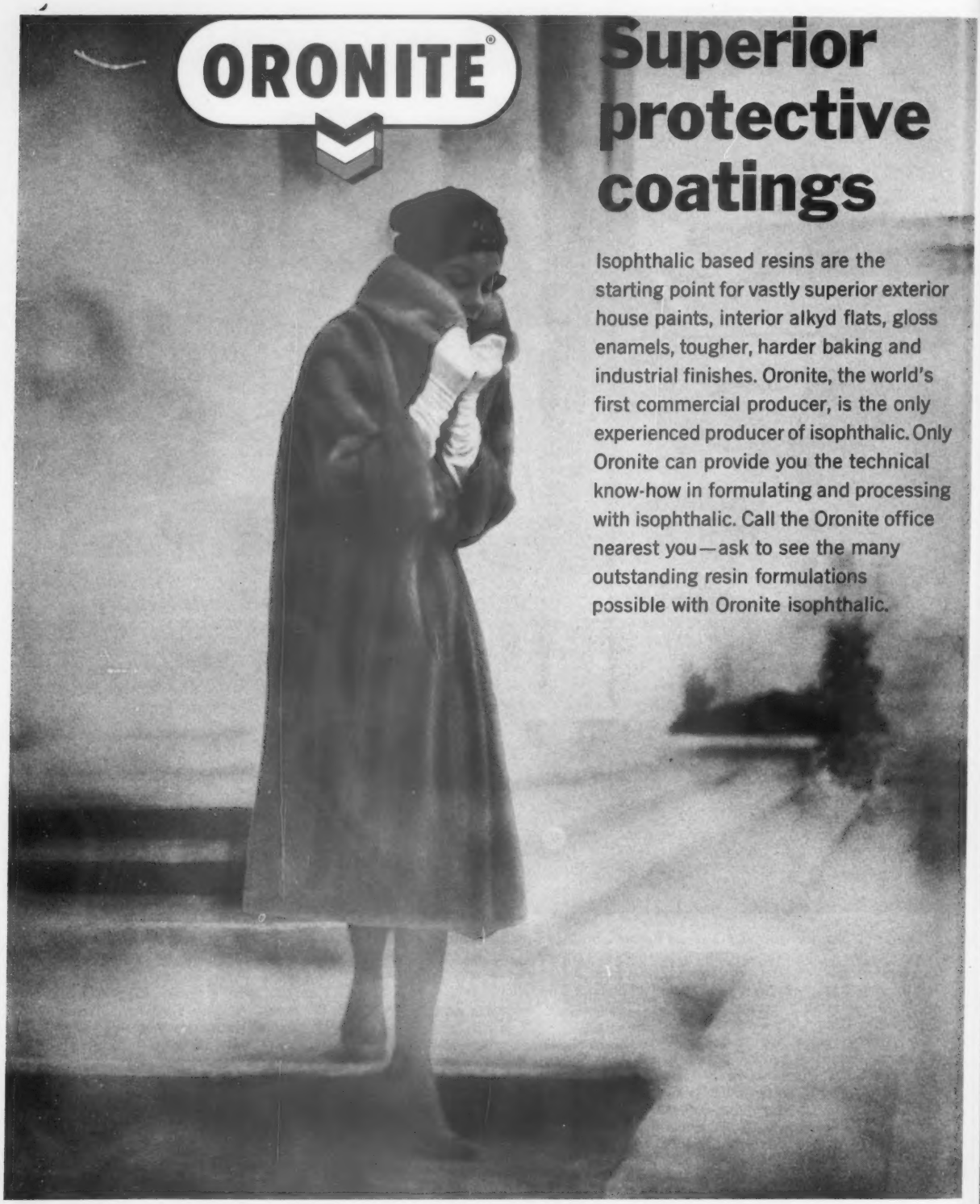
For *Aliphatic Petroleum Naphthas, Alcohols and Acetates, Alkanolamines, Petroleum and Coal Tar Aromatic Solvents, Chlorinated Paraffins, Chlorinated Solvents, Dowanols and Glycerine, Glycols and Glycol Ethers, Ketones and Esters, Plasticizers, Resinates, Rosins, Terpene Solvents, Waxes,* call your conveniently located "local" Solvents and Chemicals source listed on this page. You'll find it to be an organization of dedicated specialists who can help assure *your* firm of continued dynamic growth in the months ahead!

Look for the SC seal in the "Yellow Pages" of your directory under the "Solvents" or "Chemicals" listing

Cincinnati 29, Ohio; 4619 Reading Road, ELmhurst 1-4700
Buffalo 7, N.Y.; Box 73, Station B, Bedford 1572
Chicago 12, Ill.; 2540 W. Flournoy St., SEeley 3-0505
Louisville 16, Ky.; Dixie Highway at Appleton Lane, EMerson 8-5828
Indianapolis 22, Ind.; 1650 Luett Ave., MElrose 8-1361
Fort Wayne 8, Ind.; P.O. Box 147, Anthony 0213
St. Louis 7, Mo.; 419 De Soto Ave., GArfield 1-3495
Kansas City 20, Mo.; 2522 Nicholson Ave., CHestnut 1-3223
Cleveland 11, Ohio; 3470 W. 140th St., CLearwater 2-1100

SC Solvents Chemicals Group Member

New Orleans 18, La.; 917 Jefferson Highway, P.O. Box 4067, Carrollton Station, VErnon 3-4666
Houston 29, Texas; 8501 Market St., ORchard 2-6683
Dallas 12, Texas; 2500 Vinson St., FEderal 1-5428
Toledo 14, Ohio; 4051 South Ave., Jordan 3771
Detroit 11, Mich.; 6472 Selkirk Ave., WAlnut 1-6350
Windsor, Ont., Canada; 1454 Crawford St., CLearwater 2-0933
Milwaukee 14, Wis.; 1719 S. 83rd St., GReenfield 6-2630
Grand Rapids 8, Mich.; 2940 Stafford Ave. S.W., CHerry 5-9111



ORONITE CHEMICAL COMPANY
A CALIFORNIA CHEMICAL COMPANY SUBSIDIARY

EXECUTIVE OFFICES • 200 Bush Street, San Francisco 20, California
SALES OFFICES • New York, Boston, Wilmington, Chicago, Cincinnati, Cleveland, Houston, Tulsa, Los Angeles, San Francisco, Seattle
Foreign Affiliate: California Chemical International, Inc., San Francisco, Geneva, Panama

5193

There's a big new market for your paint

This year an estimated 50 million pressure cans will be used to package paint, clearly making pressurized products the fastest-growing part of the paint industry. Pressurized paints for touch-up jobs, for waterproofing or protective coating—all these and others have found strong consumer acceptance.

Yes—there is a difference

If your paint brand is not yet available in this handy—and profitable—form, you should know these facts:

—Canco offers the largest selection of pressure cans of any container manufacturer.

—Canco pressure cans have the strongest side-seam construction made.

—*Only* Canco offers an end-use warranty backed by research tests.

The experienced contract loaders listed here are ready to pack your product, give you sound advice. Call the company nearest you for further information—or, talk to the man from Canco!

Acrolite Products
West Orange, New Jersey

Airosol Company, Inc.
Neodesha, Kansas

Allied Professional Assoc., Ltd.
Attica, New York

Capital Packaging
Forest Park, Illinois

Chase Products Company
Broadview, Illinois

Continental Filling Corp.
Danville, Illinois

Demert & Dougherty
Chicago, Illinois

Eveready Pressurized Products Company
Cleveland, Ohio

Fluid Chemical Corp.
Newark, New Jersey

Gene Rose Company, Inc.
Chicago, Illinois

Hysan Products Company
Chicago, Illinois

Illinois Bronze Company
Chicago, Illinois

R. J. Kerr Chemicals, Inc.
Park Ridge, Illinois
and
Redwood City, California

Katonah Chemical
Bridgeport, Connecticut

Lawson Chemical Company
Culver City, California

Titan Chemical Industries, Inc.
Denver, Colorado

Midwest Aerosols
Chicago, Illinois

National Chemical Laboratories, Inc.
West Palm Beach, Florida

National Spray Can Filling Co.
Brooklyn, New York

Par Industries, Inc.
Los Angeles, California

Peterson Filling Corp.
Danville, Illinois

Plasti-Kote, Inc.
Cleveland, Ohio

Powr-Pak, Incorporated
Bridgeport, Connecticut

Red Devil Chemicals, Inc.
Mt. Vernon, New York

Southeastern Packaging Company
St. Petersburg, Florida

The Sargent-Gerke Company
Indianapolis, Indiana

Sprayon Products, Inc.
Cleveland, Ohio

Stalfort Pressure-Pak, Inc.
Baltimore, Maryland

Strobel Products Company
Louisville, Kentucky

Strouse, Inc.
Norristown, Pennsylvania

Seymour of Sycamore
Sycamore, Illinois

Texas Aerosols, Inc.
Houston, Texas

Thomasson Of Pa., Inc.
Norristown, Pennsylvania

CANCO Division AMERICAN CAN COMPANY

New York · Chicago
New Orleans · San Francisco

SHAWINIGAN RESINS FORMULA

29.4% of the combined chromate plus extender pigmentation is made up of Celite 266 in Shawinigan Resins Wash Primer formula B1001. In formula B1002, the Celite proportion is 28.3%. For full details write for Brochure on Butvar® and Formvar® in wash primers. Address Shawinigan Resins Corporation, Springfield 1, Massachusetts.

Wash primers that don't settle go on fast and easy

To assure a soft dispersible cake Shawinigan's formula B1001 calls for Celite diatomite

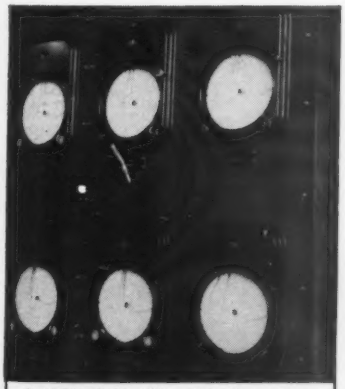
IN polyvinyl butyral wash primers, Celite's* high bulking action and unique particle structure help control hard packing to assure easy application, stability and good performance. Being inert chemically, Celite also provides non-reactivity and compatibility with wash primer pigments. Irregular microscopic Celite particles also promote adhesion of top coats when they are present in primer formulations.

Find out how Celite helps combat hard pigment settling in wash primers. Write for further information to Johns-Manville, Box 14, New York 16, N.Y. In Canada, Port Credit, Ontario.

*Celite is Johns-Manville's registered trade mark for its diatomaceous silica products.

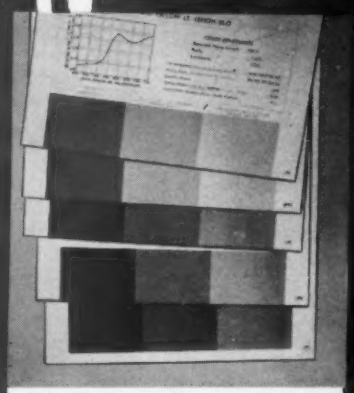
Johns-Manville CELITE Diatomite Pigments

WHY MAPICO MEANS STABILITY



INHERENTLY indifferent to the ravages of alkalis, Mapico synthetic iron oxide pigments result from long research to perfect production techniques.

ENDLESS testing during every step of production is your assurance that every Mapico pigment matches the most precise quality control standards.



MAPICO offers a wide range of colors for a wide range of uses—yellows, tans, reds, browns and black. For complete information and samples, write!

MAPICO pure synthetic iron oxides give you many other advantages . . . permanence, high hiding power, effective UV screening, good suspension, freedom from abrasion and complete uniformity batch after batch, year-in and year-out. Get all the facts . . . now!

MAPICO IRON OXIDES UNIT

COLUMBIAN CARBON COMPANY

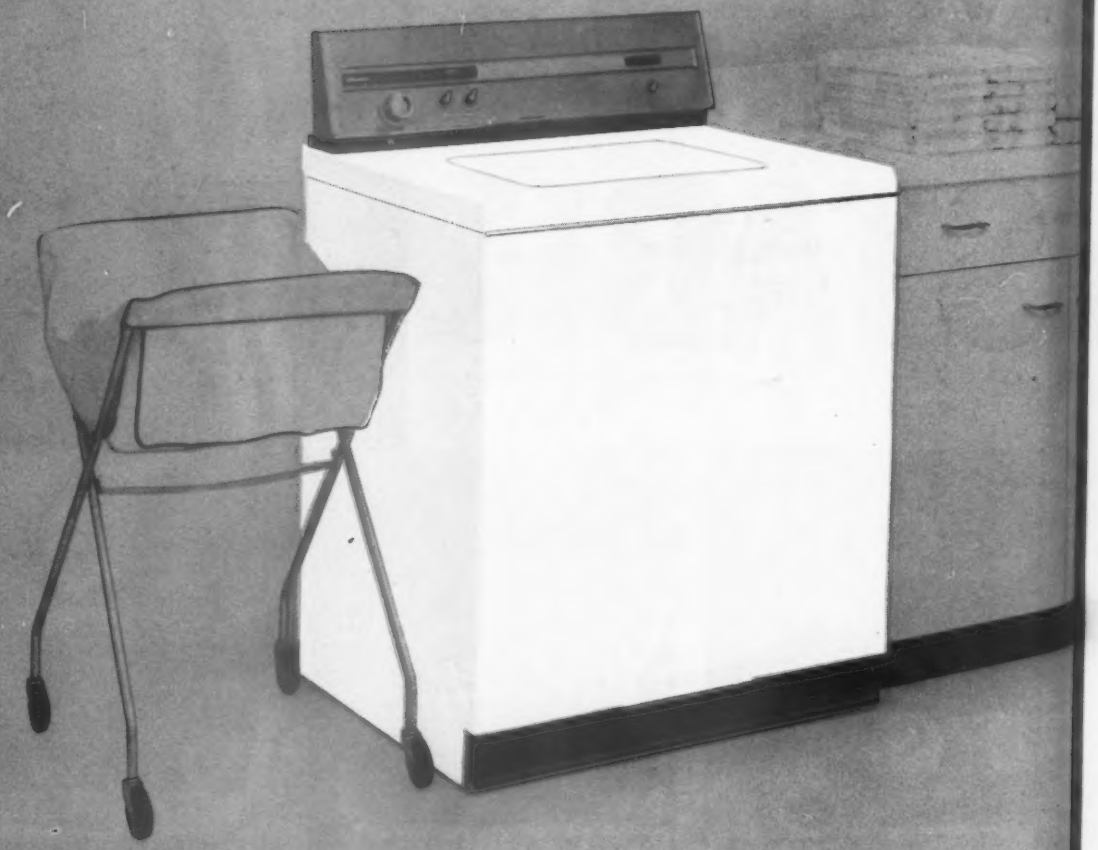
380 Madison Avenue, New York 17, N. Y.

Branch offices and agents in principal cities

PRODUCERS OF COLUMBIAN COLLOIDS: synthetic iron oxide pigments, carbon bl

FINEST APPLIANCE FINISHES...

begin with Glidden R-11 Zopaque® Titanium Dioxide



Appliance finishes that really sparkle need the excellent gloss and color performance provided by Glidden R-11 Zopaque Titanium Dioxide. R-11 Zopaque is the finest low oil absorption grade of titanium dioxide obtainable. What's more, R-11 possesses greatly improved dispersion characteristics, and provides high hiding power, greater whiteness and cleaner tints.

Write now for complete details about how R-11 Zopaque can help improve the product finishes you manufacture. Additional special grades of Zopaque are also available for the formulation of product finishes.

QUALITY Glidden PRODUCTS

FINEST PIGMENTS FOR INDUSTRY

The Glidden Company
Chemicals—Pigments—Metals Division
Baltimore 26, Maryland

Magic Touch of Aerosol Packaging opens bigger markets for touch-up paints

"It's faster," say consumers. "It's easier. It's neater." These advantages of aerosol paints sold over 30.5 million cans in 1957—more than half again as many as in 1956!—and the market is still growing fast!

The paint field is now seeing the same kind of revolutionary sales impact that aerosol packaging has had on hair sprays and insecticides, shave creams and room deodorants. And if *you're* thinking of marketing aerosol paints or any other product in aerosol form, we'd like to help.

How General Chemical can serve you

As a leading producer of aerosol propellants, General Chemical provides a great many helpful services to present and prospective aerosol marketers. We will, for example, be glad to work with you to develop a formulation with the right pressures and compatibilities for your product and container.

We will direct you to many capable contract fillers in every part of the country who will put up your product in aerosol form for test marketing and handle full commercial production as well. In this way, you can enter the aerosol marketplace without investing a cent in plant, special equipment or production personnel!

General Chemical services include:


New Product Ideas


Technical Literature and Market Data


Technical Assistance with Product Development and Formulation

For further information—or if you would like to arrange for a special presentation—write today to "Genetron" Dept., General Chemical Division, Allied Chemical Corporation.

genetron®
aerosol propellants

Putting the "push" in America's finest aerosols

Allied Chemical

GENERAL CHEMICAL DIVISION
40 Rector Street, New York 6, N. Y.

"SO SHE WANTS TO MOVE RIGHT IN!"

AND SO SHE CAN if the room is finished with flat wall paint made with Spencer Kellogg's KELTROL 1059.

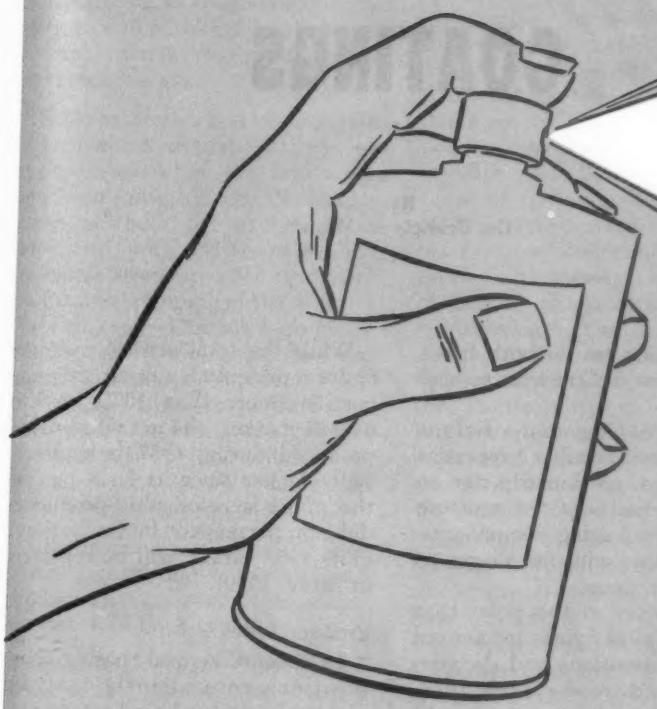
IT LEAVES NO LINGERING ODOR.

Keltrol 1059 produces fine quality flat wall paints for interiors that look beautiful, dry fast, and have no unpleasant after-odor.

This is a special Vinyltoluene Vegetable Oil co-polymer in odorless mineral spirits. It has controlled thixotrophy for the best flow properties in application by roller or brush, *yet no sag.* It is easily pigmented, stable in the can, and excells in color uniformity.

Write for the Bulletin of the Kellogg Technical Service Department and its help in setting up your own tests.

SPENCER KELLOGG AND SONS, INC., BUFFALO 5, N. Y.



AEROSOL COATING TECHNOLOGY

AEROSOL COATINGS

By
Dr. Francis A. Mina*

THE FAST growing aerosol industry that started publicly with the historic "bug-bomb" of 1945 has come a long way. Certainly some of the most dramatic performers in this field belong to the general category of aerosol coating compositions.

Included in this group are such products as clear lacquers, protective plastic coatings, pigmented and metallic paints, etc.

The first aerosol coatings appeared just ten years ago and met with immediate consumer acceptance. Unfortunately, however, in a number of instances, subsequent consumer *rejection* of aerosol paints ensued primarily due to lack of experience in proper formulation as well as inadequate knowledge of the limitations in aerosol packaging components and technology.

Any good paint formulation designed for brushing is the result of careful selection, compounding and testing of each component as well as of the final product. Just as such a product differs from one designed for conventional spray gun application, so do both types differ from one designed for aerosol application.

Aerosol coating compositions have their own peculiar properties and problems, particularly due to the characteristics of the pressure source and packaging components. These factors will be discussed further on in detail.

Suffice to say at this point that the current sales figures for aerosol coating compositions and the continual upward trend entirely justifies the faith and conviction of the early aerosol paint pioneers as to the ultimate consumer acceptance of this group of products.

The total number of aerosol coating compositions reported in the annual aerosol survey conducted by the *Chemical Specialties Manufacturers Association* is given in Table 1. Since not all aerosol manufacturers and marketers chose to participate in the survey, the actual sales figures are substantially higher than the reported figure show.

While the total aerosol coatings figure represents a substantial proportion (more than 10%) of the overall market, the actual number produced during 1957 is substantially higher since at least one of the major aerosol paint producers did not participate in the survey. (The 1958 survey will be reported in May 1959).

Product Types

In general, aerosol coating compositions conveniently may be divided into three broad categories: *Lacquer type*, *Varnish type*, and *Water-miscible*.

While the last-mentioned type is relatively new in aerosol form, and holds considerable promise of success, the lacquer and varnish types have been responsible for the success of this category.

The lacquer type is differentiated from the varnish type in that the sprayed film "cures" by means of evaporation of solvent, while the varnish type cures by oxidation and/or polymerization.

Year	Total non-Food Aerosols (All types)	Pigmented and Metallic Paints	Clear Sprays	Total Coatings Produced	% of Total Market
1951	34.2	1.78	0.95	2.7	7.9
1952	96.6	4.49	2.23	6.7	6.9
1953	131.5	8.26	2.36	10.6	8.1
1954	169.4	8.20	1.35	9.6	5.7
1955	236.8	7.72	1.52	9.2	3.9
1956	293.2	19.58	2.97	22.6	7.7
1957	339.5	30.53	6.00	36.5	10.8

Table 1. Survey of aerosol coatings (in millions of units). Source: Chemical Specialty Manufacturers Association Annual Aerosol Survey

*Technical Director, Lodes Aerosol Consultants, Inc.

General Considerations

Lacquer type—Aerosol lacquers dry rapidly and mainly base their film forming properties on either nitrocellulose or acrylic resins.

Nitrocellulose performs well with pigments producing excellent opacity and color retention, and durable films. Acrylic films generally are not as tough nor do they work as well with certain pigments. However, the acrylics produce very good clear sprays.

Because of the fast drying rate of lacquers, a second coat may be applied soon after the first layer has been sprayed. However, because of the rapid drying, short bursts of spray are recommended for application in order to ensure uniform overlapping of the film.

Varnish type—Varnishes generally employ alkyd resins as the film ingredient. Alkyds cure more slowly than the lacquers, permitting a build-up of the film into a uniform layer as well as good adhesion to the substratum. Alkyd films also have a high degree of gloss.

Alkyds are often combined with lacquers to obtain a finished end product having the best characteristics of both types.

Water-miscible type—Current interest in this type mainly is based on the water-soluble characteristics of polyvinylpyrolidone and vinyl acetate when formed during manufacture into a copolymer. PVP/VA is available commercially in anhydrous isopropanol solution containing 50% of solids. The solids portion consists of PVP and vinyl acetate in different proportions, but a 30 to 70 ratio of PVP to VA seems to provide the best results.

The degree of water miscibility as well as tackiness of the film during the drying period is affected by the ratio of PVP to VA.

To date, water miscible coatings of this type have been limited to "non-permanent" use, e.g., for decorative purposes, tinting glass, decorating windows, coloring flowers, etc. A true water-base paint, however, has not yet been successfully marketed due primarily to the problem of corrosion of containers and propellant limitations.

Propellants

The propellant of choice for aerosol coatings is the non-flammable* fluorocarbon dichlorodifluoromethane (Propellant 12) either alone or in combination with trichloromonofluoromethane (Propellant 11). The hydrocarbons, butane, isobutane and propane, have also been used in some instances but the handling of these materials poses problems for most aerosol fillers. Also, while the fluorocarbons tend to suppress the flammability of the aerosol composition, the hydrocarbons tend to increase the flammability, Because of the favorable cost factor of the hydrocarbon propellants, however, serious consideration is given to a propellant combination of fluoro—and hydrocarbons.

Methylene chloride and other non-flammable solvents are being utilized more and more to suppress the flammability of the overall product. A new resin** has been introduced recently, said to permit the formulation of a completely non-flammable aerosol paint.

Selection of the type and proportion of propellant depends upon the characteristics of the product base, including the amount of solids present, proportion and type of pigment, degree of propellant solubility in the vehicle, and extent of pressure-depressant action of the formulation in the propellant.

The formulations suggested herein are so designed as to produce gauge pressures not in excess of 40 pounds at 70° F, the allowable limit for most aerosol containers.

*Fluorocarbon propellants available under the trade names:

Freon	E. I. DuPont de Nemours
Genetron	General Chemical
Isotron	Pennsalt Chemicals Co.
Ucon	Union Carbide Corp.

**Darasol, Diamond Alkali Co.

For special applications, containers are available for use with pressures of up to 70 PSIG at 70° F.

Propellant density and solvent properties are important characteristics in that these factors affect the suspension of pigments as well as the viscosity of the end product. Table 2 gives the densities as well as the Kauri-Butanol values-indicative of solvent power-for the commonly used propellants and solvents.

Valves

Due to the wide variation in formulations, and differences in valve designs among the manufacturers, it would be impractical to make specific recommendations for this component.

While almost any aerosol valve will spray coating compositions, valve manufacturers have available specially designed valves for the various formulation types as well as desired spray characteristics. The valve parts must be selected carefully so as to avoid distortion or even disintegration during storage due to contact with any of the ingredients used in the product base.

Filling Procedure

Most aerosol coatings have been produced by the *pressure filling* method whereby product base is first put into the container which is then sealed with the spray valve followed by loading of the propellant through the valve.

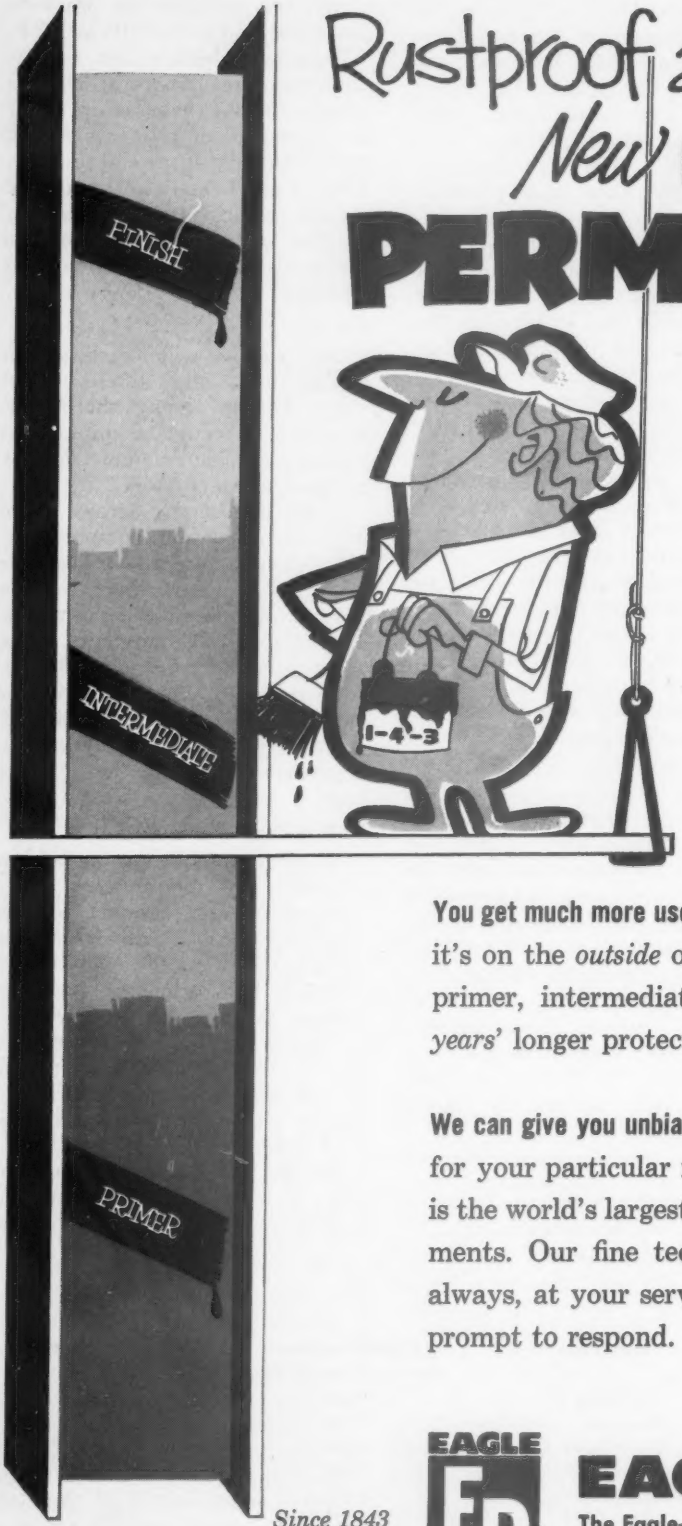
This procedure generally results in less loss of propellant and is carried out at room temperature, but is somewhat slower than the *cold filling* technique.

In the latter method, the product base is cooled to below the boiling point of the propellant

(*Turn to page 81*)

Material	Liquid Density (gms./ml at 20° C)	Approximate K -B Value
Propellant 11	1.485	60
Propellant 12	1.325	18
Propellant 114	1.478	12
Benzene	0.879	130
Carbon tetrachloride	1.595	113
Chloroform	1.498	208
Heptane	0.684	36
Methylene chloride	1.336	136
Toluol	0.867	100
Xylol	0.880	93

Table 2. Propellant and solvent densities and Kauri-Butanol values.



Rustproof all 3 coats with...

New EAGLE-PICHER PERMOX 1-4-3

ONE-FOR-THREE

(Basic Lead Silico Chromate)

One-for three... *One* protective pigment *for* all *three* coats of paint. That's new Permox 1-4-3. It protects metal surfaces against rust and corrosion and retains colors almost indefinitely.

You get much more use per pound of lead chromate, because it's on the *outside* of the particle. Put Permox 1-4-3 in primer, intermediate and finish coats and you'll get *years'* longer protection.

We can give you unbiased counsel on the best formulations for your particular needs. That's because Eagle-Picher is the world's largest producer of *both* lead and zinc pigments. Our fine technical and research staffs are, as always, at your service. We welcome inquiries and are prompt to respond.

Since 1843

EAGLE EP PICHER

EAGLE-PICHER

The Eagle-Picher Company • Cincinnati 1, Ohio

Regional Sales Offices: Atlanta, Chicago, Cleveland, Dallas, New York, Philadelphia, Pittsburgh.

West Coast Sales Agent, THE BUNKER HILL COMPANY, Chemical Products Division
Seattle • Portland, • Oakland • San Francisco • Los Angeles • Kellogg, Idaho

This new packaging idea boosts sales to record $65,000,000

In 1957 aerosol paints almost doubled their sales record set in 1956. Aerosols are filling consumers' needs for paint in small packages to the tune of $65,000,000 a year and have also revolutionized sales for hair fixatives, colognes, insecticides and a host of other products.

The reasons for this success are simple. Aerosols deliver a product in a completely new form—a form that's easier to use and apply, with less mess and waste. These are the reasons housewives gave in a recent market survey for preferring the aerosol 2 to 1 over any other method of applying touch-up paints. If *your* product can be brushed, poured or sprayed, you stand a good chance to add new sales appeal—create a positive competitive advantage—if you package it in an aerosol.

It's not necessary to set up your own aerosol packaging lin to enter this field. A custom filler near you has the specialize knowledge and equipment to help you. He can package you formulation for testing and help you from planning throug production.

* * *

If you don't know the name of a custom filler, write Du Pon We'll send you a list and include survey data on the marke for aerosol paints, plus information about Freon* propellent for aerosols. More of today's successful aerosols are powere with "Freon" than with any other propellent. Write: E. du Pont de Nemours & Co. (Inc.), "Freon" Products Div sion 432, Wilmington 98, Delaware.

Best-selling aerosols are powered with

FREON® *propellents*

DU PONT
REG. U.S. PAT. OFF.

BETTER THINGS FOR BETTER LIVING ... *THROUGH CHEMISTRY*

*FREON AND COMBINATIONS OF FREON- OR F- WITH NUMERALS ARE DU PONT'S REGISTERED TRADEMARKS FOR ITS FLUORINATED HYDROCARBON PROPELLENTS.

FORMULATION OF AEROSOL LACQUERS

ACRYLIC TYPE

The acrylic solutions, which are formulated into a wide range of coatings, are particularly valuable in the aerosol spray-lacquer field. The chief reason for this lies in the inherent transparency of the acrylic material, and its resistance to yellowing or coloring upon prolonged exposure. These considerations, coupled with their electrical properties, ease of formulation, and simple methods of application have led to the widespread use of acrylic solutions in formulating clear protective aerosol spray coats, bronze and "silver" lacquers, and many pigmented acrylic lacquers.

The use of acrylic solutions extends from general applications to specialized uses. By and large these solutions present the consumer with a chemically inert, adhesive, non-yellowing coating.

In aerosol paints, they can be formulated with many pigments. The acrylic solutions are particularly useful in metallic paints, where their transparency, water-white color retention and ability to coat the suspended metallic particles with an oxygen-resistant layer, all contribute significantly to the success of the product.

Clear, unpigmented acrylic aerosol sprays have found a wide field of application. For example, they are used as clear coatings to protect aluminum products. By coating the aluminum, particularly architectural aluminum, the metal is safeguarded against the corrosive action of wet mortar or cement. Silverware which is seldom used, or which is kept for display purposes, may be coated with clear acrylic lacquer to prevent tarnishing. Since the plastic film which is formed excludes oxidizing agents and hydrogen sulfide from the polished metal surfaces, the silverware retains its original appearance for long intervals. The clear acrylic spray has been used as a protective coating for paintings, pencil and charcoal drawings, and other art forms, where the sturdy acrylic film protects against smuding or abrasion.

For coating low voltage marine or automotive electrical systems, acrylic spray films dry in minutes to form a hard, clear, waterproof coating of high dielectric strength and weather resistance. High voltage applications include ignition systems, high voltage sockets, leads, transformers, and connections of radio, TV, and military electronic equipment which are sprayed with acrylic lacquer. With a typical dielectric strength of about 400 volts per mil. the acrylic coating eliminates corona and arcing in high voltage equipment. It is frequently sprayed on the bell part of metal picture tubes to minimize the collection of dust. Clear acrylic aerosol spray is also applied to TV and radio antennae and leads to prevent rusting, pitting, and to make the equipment resistant to salt spray.

A totally different but seasonally popular use for the aerosol acrylic solutions is in the form of spray-on artificial snow.

Formulation

The production of acrylic aerosol sprays usually follows several well defined steps. Solvents are added to increase the compatability of propellants, and to alter the viscosity of the supplied acrylic resin. Modifiers are added, pigments are ground—for colored lacquers—and finally the propellant is added before crimping the cans.

In production, the acrylic resin solutions should be diluted with toluol to about 18 to 20% dissolved solids (Table 1). Such a dilute solution is easier to work with, and lends itself to the addition of the propellant much more readily than the concentrated resin as supplied. The finished, packaged, aerosol formulation usually contains about 6% of resin solids. A more concentrated solution may tend to clog valves, or not to give a good spray pattern. A less concentrated solution doesn't provide adequate

Vehicle Solids	Ratio of Solids	Solvent Reduction (Solids Reduced to)	Solvent	Ratio of Resin Solution Added to Propellant	Final % Solid Vehicle
Acryloid B-72					
B-72	100	20%	Toluol	45/105	6%
B-72/A-101	90/10	20%	Toluol	45/105	6%
B-72/A-101	90/10	18%	Toluol/MEK:9/1	50/100	6%
B-72/A-10	90/10	18%	Toluol/MEK:9/1	50/100	6%
B-72/VYHH (20% MIK)	90/10	18%	Toluol/MIK:1/1	50/100	6%
Acryloid B-82					
B-82		20%	Toluol	45/105	6%
B-82/A-101	95/5	20%	Toluol	45/105	6%
B-82/A-10	95/5	20%	Toluol	45/105	6%

Table I. Acrylic aerosol compositions.

coverage. Toluol is the most commonly used solvent for Acryloid B-72. Other solvents, like Solvesso 100, or Solvesso 150, improve the leveling characteristics of the coating at some sacrifice of drying speed. On the other hand, some ketone type solvents, like methyl ethyl ketone, impart very rapid drying at the expense of good leveling characteristics. Methyl isobutyl ketone lengthens the drying time.

Modifiers

There are a number of materials that can be employed to modify Acryloid B-72, if desired. Acryloid A-10, A-101, nitrocellulose or Vinylite VYHH can be used. When these materials are formulated into product, stronger solvents are necessary to keep the vehicle in solution and to prevent valve clogging.

The manufacture of colored acrylic sprays is accomplished by the addition of conventional pigment materials. The chief problem in preparing colored lacquers of this type lies in the proper dispersion of the pigment particles. Good pigment dispersion is difficult to achieve without precision equipment, and the smaller manufacturers of colored acrylic lacquers frequently turn to suppliers of pigments who disperse pigments in the acrylic resin. The use of such pigments, predispersed in acrylic solutions, is fairly widespread.

As a propellant mixture, equal parts of Freon 11 and Freon 12 develop a satisfactory 40 psi. of pressure. This particular combination of propellants is also satisfactory from the point of view of their solvent action. They are about equivalent in solvent power to carbon tetrachloride.

In the above formulations, Acryloid B-82 or the other Acryloid resins are not suitable for direct substitution in place of Acryloid B-72, because the Acryloid B-82, for example, is slightly less soluble and requires stronger solvent systems.

Artificial snow, while not properly considered a paint or lacquer, is formulated from Acryloid acrylic resin solutions, and is prepared in aerosol form. It may be formulated from Acryloid B-72 100% solids. The solid resin is dissolved to about 9% concentration in suitable propellants with no other solvent. The simple combination of Acryloid B-72 100% solids with the Freon type propellants produces a splendid snow, but a somewhat unpleasant odor. The odor can be overcome by the inclusion of suitable deodorants or masking agents at the rate of 0.5% to 0.75% of the final packaged solution.

All in all, the acrylic vehicle for aerosol coatings presents the formulator and the consumer with all the qualities most desirable in this type of product. Customer response in the form of repeat sales has proved excellent. Formulation and production are simple and require no special facilities for the handling of these products.

NITROCELLULOSE TYPE

The most important factor in formulating a nitrocellulose lacquer for aerosol use is to obtain compatibility with the propellant gas. Such gases are complete nonsolvents for nitrocellulose and the modifying resins usually used with it. It is necessary to design a solvent system with all active solvents so that precipitation of the solid phase will not occur on dilution with the propellant gas. In effect, the propellant gas then becomes the diluent.

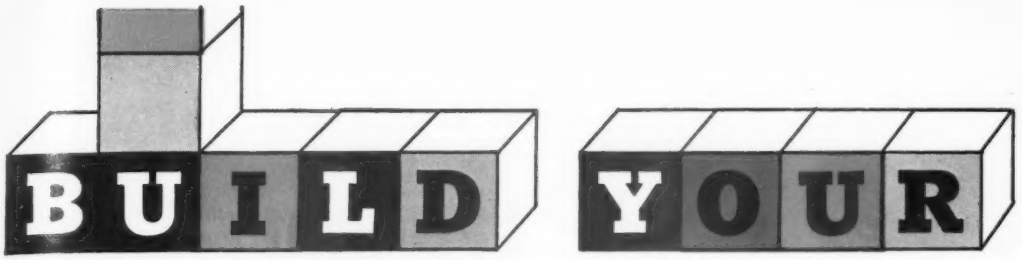
Nitrocellulose lacquers can be packaged in aerosol dispensers at reasonably high solids contents by modifying the solvent combination of an ordinary lacquer. The ordinary solvent combination used for conventional nitrocellulose lacquers consists of a three-component system; an active solvent, a latent solvent, and a diluent. The diluent acts as a solvent for the resin and lowers the cost of the solvent combination. Aliphatic and aromatic hydro-carbons are useful as diluents for nitrocellulose lacquers. The fluorinated-chlorinated hydrocarbon propellants such as dichlorofluoromethane are not solvents for nitrocellulose or other

(*Turn to page 94*)

Solids Content	Clear	Green
RS Nitrocellulose, ½-sec...	43.5	30.4
Beckosol 23.....	43.5	30.4
Dibutyl phthalate.....	13	9.2
Chrome green, medium dark	—	30
Solvent Combination		
Methyl isobutyl ketone....	80	80
Butyl Cellosolve.....	10	10
Isopropanol.....	5	5
Ethyl alcohol.....	5	5
Per cent total solids.....	19	21
Viscosity No. 4 Ford cup....	18	19

For aerosol application, the above lacquers are mixed with an equal weight of Freon 12 or its equivalent.

Table II. Nitrocellulose aerosol formulations.



LEAD-FREE COLOR BUSINESS

For Trade Sales–Toy Finishes Requiring Non-Toxic Pigments

ASK YOUR KENTUCKY COLOR SALES REPRESENTATIVE *ABOUT LEAD-FREE COLORS!*

- **HANSAS**
- **BENZIDINES**
- **DINITRO-ORANGE**
- **PIGMENT-GREEN-B**
- **ORGANIC REDS, GREENS, BLUES**

Write Technical Service Dept. For Complete Information

OR

Write for Bulletin #32, the new Kentucky Color & Chemical Company's Lead-Free Color Bulletin, containing basic information on lead-free color systems.

Kentucky Color
AND CHEMICAL COMPANY, INC.

Subsidiary of
The Harshaw Chemical Company
Louisville 12, Kentucky

AEROSOL PROPELLANTS

At present, there are four suppliers of fluorocarbon propellants: Du Pont (Freon Products Division), Pennsalt Chemicals Corp., General Chemical (Allied Chemical), and Carbide Chemicals. Some 300 million pounds of fluorocarbons are produced annually. Organic chemical products containing fluorine are exceptionally resistant to high temperatures and corrosive attack. Because of their inertness, fluorocarbons have found widespread use as aerosol propellants and refrigerants. A list of standard fluorocarbons used as propellants and refrigerants is given in Table I.

Currently there are more than 130 companies packaging aerosol products. Some merely fill pressure packages under contract with the formulator marketers; while many of the larger organizations formulate, package, and market their aerosol products under their own brand names.

The list of aerosol loaders has been increasing rapidly. It can be expected to continue to grow. Today the five largest packers use an estimated 60 per cent of all fluorocarbon propellants; however, many of the smaller organizations are expanding rapidly, and should gain an increased share of the aerosol business. Among the smaller purchasers of propellants are the cosmetics manufacturers, who have found installation of their own aerosol loading facilities profitable. More of such integrations can be expected, particularly in the low pressure aerosol applications (propellant 114 is used) where the less expensive pressure filling techniques are utilized.

Chemical Properties

The chemical properties of the propellants depend, to a great extent, upon the degree of fluorination of the hydrocarbons. Fluorine, which by itself is a highly reactive chemical, in combination with the hydrocarbon produces a highly stable and unreactive chemical, with ideal properties for propellant usage. These fluorocarbons neither burn nor oxidize under normal conditions of every day use. They are highly resistant to attack by water. The rate of reaction with water decreases in the order of 113, 11, 12, 114, and 22, when these propellants (fluorocarbons) are tested individually in contact with steel. However, they are somewhat less stable in the presence of alkaline water systems. Fluorocarbons containing hydrogen, such as propellant 22, are slightly less stable to alkali than the others.

Aerosol Propellant Systems

The following type of aerosols of interest to the paint field is classified according to the physical appearance of the propelled contents or the internal contents of the aerosol.

Type I is a Space and Surface Coating Aerosol. The appearance of the cloud or wet spray is closely related to: proportion of fluorocarbon, vapor pressure, total viscosity and valve mechanisms, which all work together to produce a voluminous cloud or a wet surface spray. The internal conditions show a small vapor space and a large liquid content of: propellant, active ingredients and carrier solvents, together in solution.

When released from container, a large expansion of the propellant carbon causes break-up of the small stream into extremely small particles. When these range in size from less than a micron to up to 50 microns, they are termed space spray.

The space sprays are represented by such products as pharmaceutical inhalants, insecticides, and room deodorants. The wet sprays are colognes, hair sprays, protective coatings, topical sprays, paints, and residual insecticides. The predominant propellants used are 114, 11 and 12.

Filling Methods

Two methods of packaging pressurized products are in current use; namely refrigeration (cold) filling,

GLOSSARY OF TERMS USED IN THE AEROSOL INDUSTRY

Active Ingredient-component of an aerosol formulation that produces the specific effect for which the formulation is designed.

Aerosol-a suspension of fine solid or liquid particles in air or gas, as smoke, fog, or mist. As defined by the Depart. of Agriculture, 100 percent of the particles in an insecticidal aerosol spray must have a diameter less than 50 microns and 80% of the particles must have a diameter less than 30 microns.

"Aerosol" Product-self contained sprayable product in which the propellant force is supplied by a liquefied gas. Includes space, residual, surface coating, foam and various other types of products but does not include gas-pressurized products such as whipping cream. The term aerosol as used here is not confined to the scientific definition.

Auxiliary Solvent-Liquid material used in addition to the primary solvent. Generally used to replace part of the primary solvent to produce some specific effect or as a matter of economics.

Chemical Attack-chemical reaction or solvent effect, causing failure or deterioration of plastic and rubber parts, organic coatings, metals, or lithography involved in the completed package.

Compatibility-broad term meaning that the various components of an aerosol formulation can be used together without undesirable physical or chemical results.

Concentrate-a basic ingredient or mixture of ingredients to which other ingredients, active or inactive, are added.

Container-metal, glass or plastic shell in which an aerosol formulation is packaged.

Corrosion-chemical alteration of the metal parts of container or valve. May lead to package failure and/or product deterioration.

Cosolvent-solvent used to improve the mutual solubility of other ingredients.

Crimp-one operation by which the valve may be permanently seated in some aerosol containers.

Delivery Rate-weight of mixture discharged from dispenser per unit of time at a specified temperature. Usually expressed as grams/second at 80° F.

Density-weight of a given volume of material at a specified temperature.

Dispenser-metal, glass or plastic shell with valve from which an aerosol or pressurized formulation is dispensed.

Eductor Tube-tubing connecting the lower portion of container or dispenser with valve. Sometimes miscalled "syphon tube" or "dip tube."

Foam Product-aerosol formulation containing a solution or emulsion which is dispensed in a highly expanded fluffy form by a liquefied gas propellant.

Head Space-volume in upper portion of dispenser not filled with liquid contents. Usually expressed as percent of total volume of dispenser at a specified temperature.

High Volatile Ingredients-see Volatile Ingredients.

Inert (or Inactive) Ingredient-component of an aerosol formulation that does not contribute to the specific effect of the formulation, In some cases, may be quite arbitrarily defined. For example, with insecticides, only the propellants are considered as inert ingredients.

Low Volatile Ingredients-see Non-Volatile Ingredients.

Metering Valve-valve that delivers a definite, limited amount of aerosol formulation each time the valve mechanism is operated.

Non-Volatile Ingredients-components of an aerosol formulation with a vapor pressure less than atmospheric pressure (14.7 lbs./sq. in. absolute) at a temperature of 105°F. Sometimes called low volatile components.

Particle Size-diameter of solid or liquid particles expressed in microns (thousandths of a millimeter).

Pressure-internal force per unit area exerted by any material. Since the pressure is directly dependent on the temperature, the latter must be specified. The pressure may be reported in either of two ways: (A) Absolute pressure—the total pressure with zero as a reference point. Usually expressed as pounds per square inch absolute (psia). (B) Gage pressure—the pressure in excess of atmospheric pressure. Under standard conditions at sea level, the numerical value of the absolute pressure is 14.7 higher than that of the gage pressure. The gage pressure is usually expressed as pounds per square inch gage (psig).

Product Deterioration-chemical reaction or physical change within or between components considered compatible in original formulation. May be due to time or temperature of storage or other factors.

Product Formulation-specific formulation of complete product, including propellant(s). Usually expressed as weight/weight (w/w) percent.

Propellant-liquefied gas with a vapor pressure greater than atmospheric pressure (14.7 lbs. per sq. in. absolute) at a temperature of 105°F.

Solubility-the extent to which one material will dissolve in another. Generally expressed as percent by weight. May also be expressed as percent by volume or parts per 100 parts of solvent by weight or volume. The temperature should be specified.

Solvent-liquid part of an aerosol formulation used to dissolve solid or other liquid parts.

Spray-the discharge from an aerosol-type dispenser in the form of small droplets or particles. Does not include foam-type discharge.

Spray Coating-aerosol spray product for surface application, which leaves a residual clear or pigmented finish for protective or decorative purposes.

Stability-ability of a product to maintain its original characteristics over extended storage periods, under normal variations in temperature conditions.

Synergist-an auxiliary material that has the property of increasing the effect of the active ingredient even though it may have little specific activity itself.

Valve-mechanism for discharging products from aerosol-type dispensers.

PRODUCT	CHEMICAL NAME	USE
Propellant-11	Trichlorofluoromethane	As a refrigerant in air conditioning systems. Solutions of Propellant-11 and Propellant-12 are used as propellants for a wide variety of low pressure aerosol products.
Propellant-12	Dichlorodifluoromethane	As a refrigerant in air conditioning systems, including household systems; also in household refrigerators, ice cream cabinets, water coolers, etc., employing reciprocating type compressors ranging in size from fractional to 800 hp or employing rotary vane type compressors. Largest single use is in combination with Propellant-11 and/or methylene chloride as a propellant in low pressure aerosol products such as hair sprays, room deodorants, and insecticides.
Propellant-22	Monochloridifluoromethane	As a refrigerant in low temperature refrigerating systems employing reciprocating type compressors. Solutions of Propellant-22, Propellant-11 and Propellant-12 are used as propellants for aerosol products requiring special solvent qualities. Most room air conditioners use Propellant -22 as the refrigerant.
Propellant-113	Trichlorotrifluoroethane	As a refrigerant in large air conditioning systems employing centrifugal compressors. Especially applicable for oxygen-containing products, where special solvent qualities are needed.
Propellant-114	Dichlorotetrafluoroethane	As a refrigerant in fractional HP household refrigerating systems and drinking water coolers employing rotary vane type compressor. Propellant-114 and Propellant-12 are used as propellants for aerosol products, where active ingredients require extreme stability—cosmetics for example. Propellant-114 is used extensively in pressurized shaving lather and cologne products.

Table I. Uses of various aerosol propellants.

and pressure filling. Choice of either method is dependent upon the type of product and/or propellant employed, desired production speed, and general operating economics.

Refrigeration filling is normally used for rapid production runs on space insecticide aerosols, or other products not sensitive to subzero temperatures, and is usually accomplished as follows.

1. Propellant and concentrate are cooled to suitable filling temperature in separate storage tanks.
2. Cold concentrate is metered into the dispenser, followed by the propellant. Then the valve or can top/bottom is sealed on the package.
3. The filled cans are immersed in a hot water bath, until contents have reached a temperature of 130°F., to check possible leakage or distortion, in compliance with I. C. C. regulations.

Pressure filling is necessary for products that are sensitive to low temperatures, such as shave cream, shampoo or other aqueous-base formulations; but may be used for any type of product, in lieu of refrigeration filling. Usually, the concentrate is loaded into the container at room temperature, and the valve or can top/bottom sealed. The dispensing valve is coupled to the propellant line, and liquid permitted to flow from the storage tank through the valve and into the container. It is desirable to evacuate the air from the container, prior to valve sealing and propellant filling. This eliminates build-up of excessive pressures, and minimizing possible container corrosion, which results when certain formulations contain entrapped air. As with refrigeration filling, the completed containers are tested in a 130°F. bath, with the exception of emulsified products, which are exempt from the bath test.

Disadvantages of the pressure-loading method, in contrast to refrigeration filling, are (1) a reduced production rate and (2) air entrapped in can, dependent upon the type of valve and equipment utilized for this operation. However, the lower cost of pressure filling equipment, coupled with the necessity for use of same with aqueous products, has influenced a large number of concerns to install this type of loading facility.

Aerosol Regulations

Like most other types of modern businesses, the aerosol industry today is subject to an increasing number of complex regulations on the federal, state, and local levels. These regulations cover a wide range of subjects, including labeling requirements, packaging, and shipping containers.

It is essential that anyone engaged in the manufacture and marketing of chemical products be familiar with all of the regulations affecting his product, particularly when such products are shipped in interstate commerce.

It should be distinctly understood that laws and regulations which apply to any type of product in a conventional nonpressurized package also apply to that same type of product in a pressurized package; and that such regulations must be complied with, in addition to the specialized regulations applicable to the pressurized package.

For example, an insecticide, packaged as an aerosol, must comply with all of the laws and regulations applicable to insecticides in general; and, in addition, must comply with all of the specialized laws and regulations pertaining to the use of a pressurized package. As an additional

(*Turn to page 80*)

HARSHAW DRIERS

are stocked Nationwide

TELEPHONE
WIRE OR MAIL
YOUR ORDERS
TO THE NEAREST BRANCH

TYPICAL HARSHAW DRIERS

LIQUID DRIERS

- Uversol (Naphthenate) Liquids
- Linoresinate Liquids
- Linoleate Liquids
- Octasols
- Pastes
- Pastalls

SOLID DRIERS

- Uversol (Naphthenate) Solids
- Linoresinate Solids
- Linoleate Solids
- Soyate Solids
- Fused Resinates

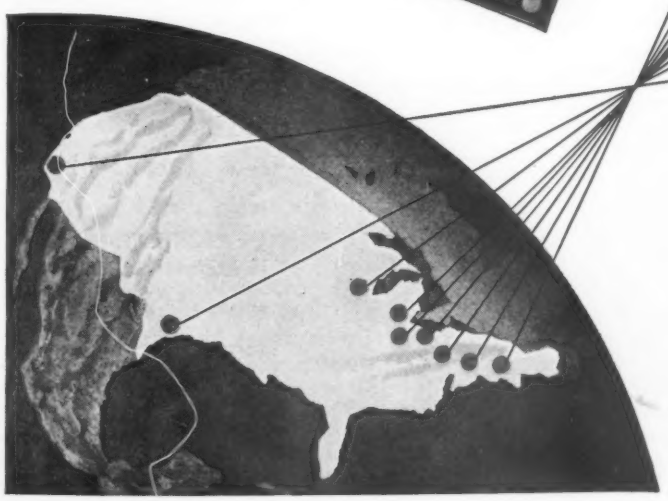
POWDERED DRIERS

- Precipitated Resinates

DRYING SALTS

- Cobalt
- Lead
- Manganese
- Zinc

Yours for the asking—
Harshaw's 36-page Drier Book



CHICAGO
4925 S. California Ave.
Phone: Republic 7-1008

CINCINNATI
6265 Wiehe Road
Phone: Redwood 1-9100

CLEVELAND
1945 East 97th Street
Phone: Randolph 1-8300

DETROIT
9240 Hubbell Ave.
Phone: Vermont 6-6300

HASTINGS-ON-HUDSON
NEW YORK
Phone: Hastings 5-8250
Lorraine 2-6250

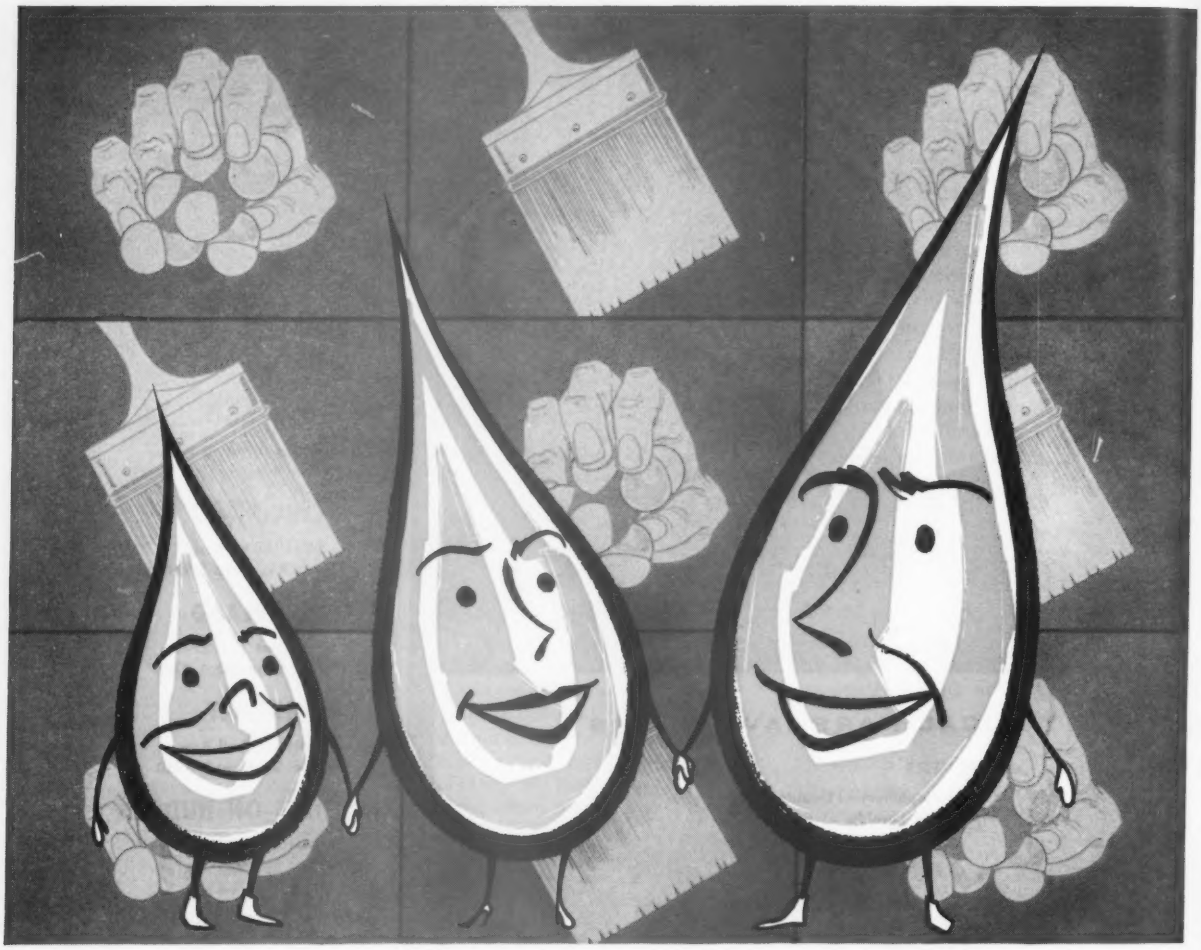
HOUSTON
6622 Supply Row
Phone: Walnut 3-1627

LOS ANGELES
3237 So. Garfield Ave.
Phone: Raymond 3-3161

PHILADELPHIA
Jackson & Swanson Sts.
Phone: Howard 2-4700

PITTSBURGH
6th Street & Fort Duquesne Blvd.
Phone: Atlantic 1-7930

THE
HARSHAW CHEMICAL
COMPANY
1945 E. 97th Street • Cleveland 6, Ohio



Go to any oil length with Glycerine

Glycerine makes short, medium or long oil alkyd resins. Its versatility for a complete line of finishes is unequalled. It permits polyol inventories to be reduced to a single multipurpose material—Glycerine.

As a liquid, Glycerine simplifies handling during alkyd resin manufacture. It can be piped into kettles. There are no bags to lift, no fines. And if needed, it's easy and safe to add more Glycerine during cooking.

Glycerine is stable in price, dependable in supply. It offers a unique range of advantages for alkyd resins. We'd like to send you our 20-page booklet: "Glycerine Terms, Tests and Technical Data." Write the Glycerine Producers' Association.

Properties

HYGROSCOPICITY • STABILITY

SOLVENT POWER • VISCOSITY

NONVOLATILITY • NONTOXICITY

TASTE • COMBINING WEIGHT

ADVANTAGES THAT COME WITH . . .

Glycerine

Applications

HUMECTANT • CARRIER

SOLVENT • LUBRICANT

SOFTENER • EMOLLIENT

ANTI-FREEZE • ALKYD BASE

GLYCERINE PRODUCERS' ASSOCIATION • 295 MADISON AVENUE, NEW YORK 17, N. Y.

AEROSOL PAINT PRODUCTION at PLASTI-KOTE

IS there any limit to the boom in aerosol paints? Herbert D. Fine, president of Cleveland's Plasti-Kote, Inc., doesn't think so. Production has jumped from 2,700,000 cans in 1951 to 23,500,000 in 1956 to an estimated 60,000,000 last year. Plasti-Kote expects to at least maintain its approximate 10% share of the market even if production reaches the phenomenal total this year of 100,000,000 cans, a figure that many industry experts insist is not impossible.

So confident is Fine in the industry's growth that Plasti-Kote, this spring, will construct a two-story, 32,000 square foot addition to its present plant. This will bring the company's total production space to 57,000 square feet.

In addition, Plasti-Kote has now doubled the capacity of one of its can filling lines to 45,000 cans a day on a single shift basis. A third filling line, with a capacity of 30,000 cans a day, has just been installed. 90% of Plasti-Kote's production is in paints.

New equipment, which will be installed next month, will double the capacity of the production line. The plant will then be capable of turning out some 12,000,000 cans a year.

Plasti-Kote maintains a staff of four chemists. Approximately 1400 different colors and formulations are produced. The company's industrial division makes matching colors for equipment manufacturers such as Remington Rand, Lockheed, General Electric, and Carrier Corp.

Despite the amazing growth of the industry, Fine reports a survey which shows that only four out of ten Americans are even aware of the existence of paints in aerosol cans.

Furthermore, the Plasti-Kote president sees certain recession-proof characteristics in his business. Automobile supply and hardware stores enjoyed a booming business in most do-it-yourself goods during the 1958 dip. That's because many unemployed people used their enforced idle time for repairs, remodeling and overhauling at home. And paint is a big factor in such activities.

Actually, drug stores and supermarkets are the biggest outlets for pressurized paints. Women have responded strongly to the color appeal in home decoration. Attractive open displays have been set up in stores to lure the female purchaser.

Utilizing Automation

Automation has played an important part in Plasti-Kote's growth. At the same time, however, company employment has increased, more than doubling in the last year.

The plant's second production line is made up of power conveyors that feed indexing turrets. One

Outside view of Plasti-Kote's Cleveland plant, where the company will construct a 32,000 square-foot addition this spring to accommodate growing production schedules.

The high speed, six-head Kiefer filler at left fills the cans with the product. At right the twin crimper-gasser unit crimps the cans and injects them with propellant.

Paint cans are seen passing specialty product concurrently being packaged on the other line. Girls stationed here place actuator buttons on the cans.

The cans have ridden four abreast in a souble conveyor line through a hot water bath, which checks for leaks or other defective possibilities. They are then dropped for sorting, and capped, coded and cartoned.

The new Binks spray system, which has been in operation a few months, sends a jet of paint onto each cap. This method is five or six times faster than the old system, which involved spraying the caps on a tray by hand. The capacity is 3,000 caps an hour, and hundreds of different colors are used. There is a more uniform pattern in the paint job, according to production manager, Fred Kessler. It is estimated that Plasti-Kote will consume about a half-million gallons of finished paint this year in packaging aerosol cans.

Identification is placed on a can cap by this Markem marker. The rubber stamp rolls and imprints the stock number and color (for example: "Plymouth 1959 Powder Blue") on the cap.

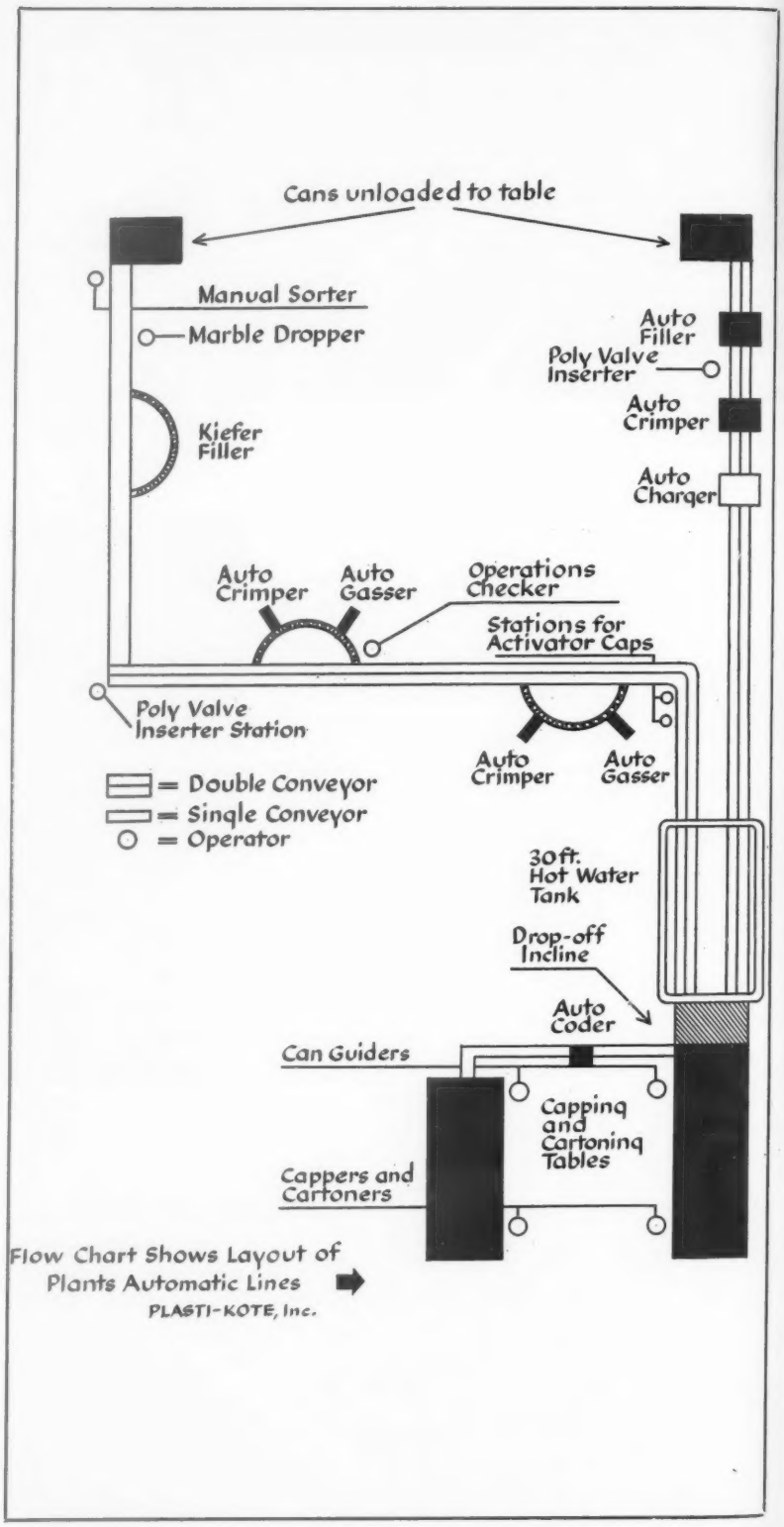
turret is used exclusively for filling, another holds the crimping and gassing apparatus. Conveyors are originally loaded from a pool by a vibrating feeder. The conveyor slides under the cans when they stop at the turret. The flexibility of its equipment allows Plasti-Kote to handle a custom order as small as 300 cans.

At one time a marble was dropped into each can by hand, but American Can Company developed an automatic "marble-dropper" which is now is use. Instructions printed on each can tell the consumer to shake the container until he hears the marble hit the sides, and to continue shaking for one minute thereafter. This action assures proper mixing of the aerosol paint.

Another American Can Company development is a unit which hopperizes empty cans and feeds them onto the conveyor line. The large variety of can sizes to be handled was a major stumbling block in the creation of this machine.

Twin crimper and charger units were set up on the line customarily used for enamel packaging in order to take advantage of the exceptionally high speed of the filler (75 to 100 cans per minute). Empty cans index in single file on a stainless-steel conveyor line to the six-head filler which gives control on 50 cc. fill, plus or minus five percent.

Cans travel on individual, revolving platform steps which raise them for fill, then lower to the level of the conveyor line where the cans discharge, again in single file. At the end of this section a girl inserts a polyethylene valve assembly in each, takes occasional check-weights and guides cans onto a two-line conveyor which turns at a 90 degree angle here. The inner line of cans is carried onto a revolving station where cans are first crimped, then charged and discharged into the line of travel. Just beyond this point of discharge, the outer line of cans rides to the second crimper-charger unit. These are discharged to join the row of previously processed cans, and pass on to receive activator caps.



The future of aerosol paints is intimately related to the ability of companies like Plasti-Kote to expand quickly to meet growing demands for the product. As Herbert Fine says, "There's no standing still in this business. The competition is hot, and sometimes it isn't enough merely to keep up with the pace—you've got to set it yourself."

USE NEWMAN-GREEN AEROSOL VALVES TO SPEED PRESSURE FILLINGS, CUT PRODUCTION STOPS

Uninterrupted production pressure filling always increases your profits. The surest way to fill aerosol containers fast and trouble-free is to use Newman-Green valves. This simplified valve design gives you a competitive edge throughout the paint industry. Exclusive features include metering orifices in spray head that are reached easily for cleaning, a design that eliminates the sources of clogging due to a build up of paint particles, and a spray pattern that can be varied completely in seconds simply by changing the valve head only.

In addition, Newman-Green valves can be used on metal or glass containers and excessive swelling of the gasket is not detrimental to valve operation. You get especially good operations in applications of retouching paints used for autos, appliances, household equipment, etc. For full details, call us today. We take pleasure in helping you design even better packaged products for today and the future.

New spatter valve gives unusual patterns, works easily.

Newman-Green, Inc. P5A
151 Interstate Road
Addison, Illinois

Please send me your price schedule and free valve samples.

Name_____ Title_____
Company_____ Address_____
City_____ State (Country)_____
Valve Application_____

NEWMAN-GREEN *Creative Aerosol Valve Engineering*

151 Interstate Road, Addison, Illinois

AEROSOL PAINT PRODUCTION PROBLEMS

By
Robert Hollister*

THE increased popularity of "pushbutton paints" has made the pressurized products the fastest growing factor in the paint industry.

This boom in the aerosol market, given impetus by recent improvements in the package, resulted in 1958 production of approximately 50 million cans, as opposed to 35 million in 1957.

For the paint industry, however, the best part is still to come. American Can Company estimates that the demand for 1959 will be about 60 million containers.

This boom, though a happy sign in the industry because it means more frequent jingling of the cash register, means that paint manufacturers are faced with "problems" of manufacturing, packaging and marketing the aerosol products.

The problems are not quite as clear cut as it might appear. It is not a matter of merely putting paint in a pressure can and selling it.

New formulations must be prepared in order to package a successful aerosol paint. This is an area in which many mistakes were made when the aerosol paint business was in its infancy. Some packers simply put thick, regular consistency paint into pressure cans made for insecticides and other products. The result was an incompatible mating; it meant spattering, clogging of nozzles and a generally unsuccessful product—not something the consumer was very happy with.

Formulations, though vitally important to the success of the product, are not the major factor manufacturers must consider in the production of aerosol paints. This problem can be aleviated by the can company working with prospective customers and devoting the services of its research department to assure the compatibility of the can and the product.

The main decision a manufacturer must reach is whether to use the services of a contract loader or "do-it-himself." There are advantages to both sides, though about 70 per cent of the pressure packed paint sold today is filled by contract loaders.

Five Million Volume

Experience indicates that a manufacturer should have an annual volume of approximately five million or more pressure cans before beginning to load his own aerosol products. Otherwise, we feel it is far more economical to contract the pressure-pack business to an outside firm.

We estimate that installation of a good aerosol filling line will cost about $100,000. This line, operating on two shifts, should produce about 10 million cans a year.

A "do-it-yourself" line offers the advantages of a self–contained packaging operation on the manufacturer's premises, where he has direct control over the operation, where he can more efficiently utilize the services of his own personnel from one operation to another, direct quality control in line with other phases of the operation, increased savings if the volume is great enough, and greater secrecy concerning new products, formulations, and market tests obtained by keeping the operation "in the family."

On the other hand, contract loading offers the advantages of savings on smaller volumes, availability of a fully-trained, efficient organization that specializes in nothing but pressure packaging, specially developed or modified equipment that provides hairline accuracy in filling and the accessability of a small-volume market test on a borderline product that might or might not be a commercial success, without involving the large investment that goes hand-in-hand with installation of aerosol filling equipment.

The contract filler also has another attractive feature to offer the manufacturer—that of volume purchasing of the components of an aerosol package.

For one thing, the contract filler will either supply the coating

(*Turn to page 95*)

*Product Marketing Div., Canco Division, American Can Company.

NOW . . . a strong COMPETITIVE ADVANTAGE for paint manufacturers!

DIANOL*

. . . adds a 3rd. dimension to ALL PAINTS

PROTECTION
DECORATION
EXTERMINATION

Paint is used for protection and decoration! *Now* . . . DIANOL adds a *3rd* use: *extermination.* For DIANOL kills *all* household bugs on contact. Guarantees bug-free surfaces for the life of the paint!

DIANOL is an insecticide additive containing DIANOL'S wonder ingredient, D-3, one of the *most potent* but SAFE insect-killers known!

DIANOL mixes with ANY type paint regardless of base . . . does not affect the color, consistency or quality. DIANOL is safe . . . harmless to people and pets when used as directed! Tested and proved for over 8 years by hotels, restaurants, hospitals and schools.

It offers *a great competitive* advantage to you, *the manufacturer* . . . all household and institutional *bug-fighters* are your market. It's a huge $$$$ potential!

Let us tell you more about this new additive now being offered to all paint users from homes to institutions . . . for crawling, flying and sucking insects.

* For full processing facts, write the DIANOL DIVISION, Mills-Pearson Corporation 2621 24th Street North St. Petersburg, Florida

DIANOL*

PAINT INSECTICIDE

* certified by U. S. Testing Corp.

ELIMINATES INSECTS FOR THE LIFE OF THE PAINT

New

LOW-COST FORMULATIONS BROADEN YOUR MARKETS

Marbon's 9200 resins can be a vital factor in helping you produce *superior* paints and lacquers at *lower* costs! Only Marbon's 9200 resins offer you so many *basic* benefits — enable you to produce multicolor paints and lacquers for diversified applications.

To broaden your markets — to increase your profits — try Marbon's 9200 resins for *your* multicolor paints and lacquers!

REDUCES PREMIUMS FOR EXPLOSION-PROOF EQUIPMENT

LOW-COST FORMULATIONS

PERMITS USE OF LOW-ODOR PAINT SOLVENTS

GOOD CHEMICAL RESISTANCE

LOW ODOR LEVEL

QUICK DRYING

GOOD CAN STABILITY

WRITE TODAY FOR ACTUAL SWATCH AND LATEST TECHNICAL INFORMATION

PACESETTER IN

Marbon CHEMICAL

SYNTHETIC RESINS

DIVISION of BORG-WARNER

WASHINGTON, W. VA.

also represented by:

WEST COAST: Harwick Standard Chemical Co., Los Angeles, Cal.

CANADA: Dillons Chemical Co. Ltd., Montreal & Toronto

EXPORT: British Anchor Chemical Corp., New York

BW

Marbon

With Shawinigan's new GELVA TS-66 you can now manufacture high quality full and semi-gloss paints. And Shawinigan offers thoroughly tested working formulations.

Gloss paints based on GELVA TS-66 do not require special additives. It is the sole vehicle, and compounding in regular emulsion paint equipment is easy.

The development of GELVA TS-66 Emulsion is another graphic example of how Shawinigan's unsurpassed emulsion technology is at work for you. For working formulations and technical information on gloss paints write to Shawinigan Resins Corporation, Department 2202 Springfield 1, Mass.

Paints formulated with GELVA TS-66 offer:

No loss of gloss by aging either in can or on the wall
High gloss—85-90% reflectance, 60° Head;
semi-gloss—55-60% reflectance, 60° Head
Washable with soap and water—no effect on gloss
Good hardness retention—film does not become tacky on washing
Paints have long shelf-life, are stable
Flexible, non-yellowing films
Plus all the other physical properties which go to make up a quality polyvinyl acetate based paint, such as good leveling and brushability, good pigment binding capacity and others.

SALES OFFICES: ATLANTA CHICAGO LOS ANGELES
NEW YORK SAN FRANCISCO SPRINGFIELD

GELVA® *emulsions for paints*

SHAWINIGAN RESINS®

NATIONAL ANTIOXIDANT B®

keeps it flowing to the last brushful!

National Antioxidant B adds a really worthwhile selling feature to your paint at lower-than-ever cost!

Only 1 to 4 lbs. per 100 gallons is all it takes to prevent skinning over in the can . . . eliminate the need for straining . . . and customer dissatisfaction. There is no appreciable change in drying time, durability, odor or color retention.

National Antioxidant B is based on the essential ingredient that effectively retarded skinning in a wide range of formulations during the most exhaustive, unbiased tests ever reported*

Also available at new low cost is National ASA®, preferred for some formulations. For odorless paints National Antioxidant D® is recommended.

We will gladly send samples of all three for your evaluation.

*As reported in Official Digest, Paint & Varnish Production Clubs, November 1956.

NATIONAL ANILINE DIVISION
40 RECTOR STREET, NEW YORK 6, N. Y.
Atlanta Boston Charlotte Chattanooga Chicago Greensboro
Los Angeles Philadelphia Portland, Ore. Providence San Francisco

Allied Chemical

5-25

Low Formula Costs · Mildew Resistance · Good Leveling · Easy Dispersion · Excellent Tint Retention

These are the big reasons why so many house and barn paints are formulated with 5-25. Are you getting these benefits too?

5-25 is a water ground calcium carbonate with the correct particle size distribution for exterior use. It is neither too fine nor too coarse, but just right. For 1st grade white paints, including primers, you can use up to 50% 5-25 as an extender, with the balance magnesium silicate. For 2nd grade white paints, tints, and red barn paints, use 100% 5-25. You'll find you will get excellent results.

THE GEORGIA MARBLE CO. 1884 1959 — 75 years of Service

C P D — The Georgia Marble Company

CALCIUM PRODUCTS DIVISION

THE GEORGIA MARBLE COMPANY, TATE, GEORGIA

PRODUCERS OF: GAMACO • GAMACO-T • GAMAKAL • CALWHITE • CALWHITE-T • 5-25 • KALMAC • NO. 10 WHITE

REPRESENTATIVES

ATLANTA 18, GEORGIA
R. T. Hopkins Company
544 Means Street, N.W.

BERKELEY 10, CALIFORNIA
Pacific Coast Chemicals Company
2060 Third Street

BROOKLYN 1, NEW YORK
Smith Chemical & Color Company
55 John Street

CHICAGO 29, ILLINOIS
Daniel G. Hereley Company
1607 Howard Street

CINCINNATI 2, OHIO
Deeks and Company
6433 Wiehe Road

CLEVELAND 16, OHIO
Norman G. Schabel Company
20950 Center Ridge Road

DALLAS 15, TEXAS
Southwest Sales Co., Inc.
P.O. Box 9275

DENVER 2, COLORADO
George C. Brandt, Inc.

FLORENCE, ALABAMA
The Byron Couch Company
105 Park Circle

GREENVILLE, SOUTH CAROLINA
Allison B. Wood Company
644 East Stone Avenue

HOUSTON 21, TEXAS
Joe Coulson Company
P.O. Box 14442

KANSAS CITY 6, MISSOURI
Morton-Myers Company
220 E. Missouri Avenue

LOUISVILLE, KENTUCKY
The L. A. Miller Company
512 Republic Building

LOS ANGELES 13, CALIFORNIA
John K. Bice Company
440 Seaton Street

MEMPHIS, TENNESSEE
Chapman Chemical Company

MILWAUKEE 8, WISCONSIN
Harold T. Illing Company
4200 West Monarch Place

MONTREAL 22, QUEBEC, CANADA
Frank E. Dempsey & Company
407 McGill Street

NEW ORLEANS 12, LOUISIANA
Griffith-Mehaffey Company, Inc.
640 South Front Street

NEW YORK 16, NEW YORK
Amkor Corporation
385 Fifth Avenue

NEW YORK 16, NEW YORK
Kenneth C. Russell Company
10 East 40th Street

PORTLAND 2, OREGON
W. Ronald Benson, Inc.
2505 S.E. 11th Avenue

PITTSBURGH, PENNSYLVANIA
Joseph A. Burns & Son

SEATTLE 4, WASHINGTON
W. Ronald Benson, Inc.
820 First Avenue South

ST. LOUIS 2, MISSOURI
G. S. Robins & Company
126 Chouteau Avenue

ST. PAUL 14, MINNESOTA
George C. Brandt, Inc.
739 Pillsbury Avenue

TRENTON 8, NEW JERSEY
Wyrough & Loser
838 Broad Street Bank Building

TORONTO 2, ONTARIO, CANADA
Frank E. Demsey & Company
266 Parliament Street

VANCOUVER 12, BRITISH COLUMBIA
Commercial Chemicals Division
Van Waters and Rogers (B.C.) Ltd.
2625 Skeena Street

WALTHAM 54, MASSACHUSETTS
Wyrough and Loser

DENVER 2, COLORADO
George C. Brandt, Inc.
Chapman Chemical Company
Joseph A. Burns & Son

A Staff Report

Cyclized Rubber in Protective Coatings

Part II

The second installment of this series of articles on cyclized rubber is concerned with storage stability, brushing and leveling properties, film formation and drying, and pigmentation. Part III, scheduled for the March issue, will deal exclusively with the film properties of cyclized rubber coatings.

STORAGE STABILITY

Figure 3 demonstrates the storage stability of various cyclized rubber ("Alpex") solutions. Starting from the standard 60% solution in mineral spirits, a further viscosity reduction was made to reach a viscosity of 60 seconds using a #4 Ford Cup at 20° C. The viscosity of solutions, held in sealed glass bottles, was checked over a two year period. The diagram shows the viscosity values of the various solutions after two years of storage under equal conditions. They give an interesting picture of the viscosity behavior of "Alpex" solutions caused by the use of various solvents and solvent mixtures. Toluene, butyl acetate and trichloroethylene cause considerable viscosity increases. A huge number of the common solvents used in the paint and varnish industries may be utilized without causing difficulties. The viscosity increase of "Alpex"—mineral spirits solutions over a two year period is only small. Through combinations of various solvents, or the use of small quantities of other solvents with mineral spirits, viscosity increases can be reduced or practically eliminated (ethyl alcohol, cyclohexanol, ethyl-glycol-acetate, etc.)as demonstrated in the diagram.

Ordinary paints containing as a binder a combination of "Alpex" to Alkyd Resin in a 1:2 ratio and pigmented in a 1:1 ratio of pigment to binder with titanium dioxide RN, zinc oxide and barium sulfate, were stored in full tin cans at room temperature and checked for skinning, settling of pigment, gel formation, and viscosity after 10 months of storage. The starting viscosity was 60 sec. #4 Ford Cup at 20° C. Skinning was only observed in the combination. A few combinations show settling, but the settled pigments can be easily reincorporated through stirring. Viscosity increases are considered normal. There is hardly any change in viscosity after 10 months of storage. Considering outside durability and its versatility, "Alkydol" S-1043 has to be regarded as the most favorable alkyd resin for cyclized rubber modifications. It goes without saying that mixtures of alkyd resins and drying oils, as well as alkyd resins and plasticizers, are suitable for various purposes. Examples given later deal with these conditions in detail.

BRUSHING AND LEVELING, RECOATABILITY

Caused by the sole use of mineral spirits as a solvent, cyclized rubber solutions formulated for brush applications have good brushability and flow, despite a high binder content. The "open" time, during which the varnish can be brushed and evenly applied, is similar to alkyd resins. The relatively good brushability can be further improved through the addition of small quantities of high boiling solvents such as turpentine, Dipentine, Tetralin, etc. An improvement in the brushability of highly pigmented primers and rust inhibitive paints, etc., can also be accom-

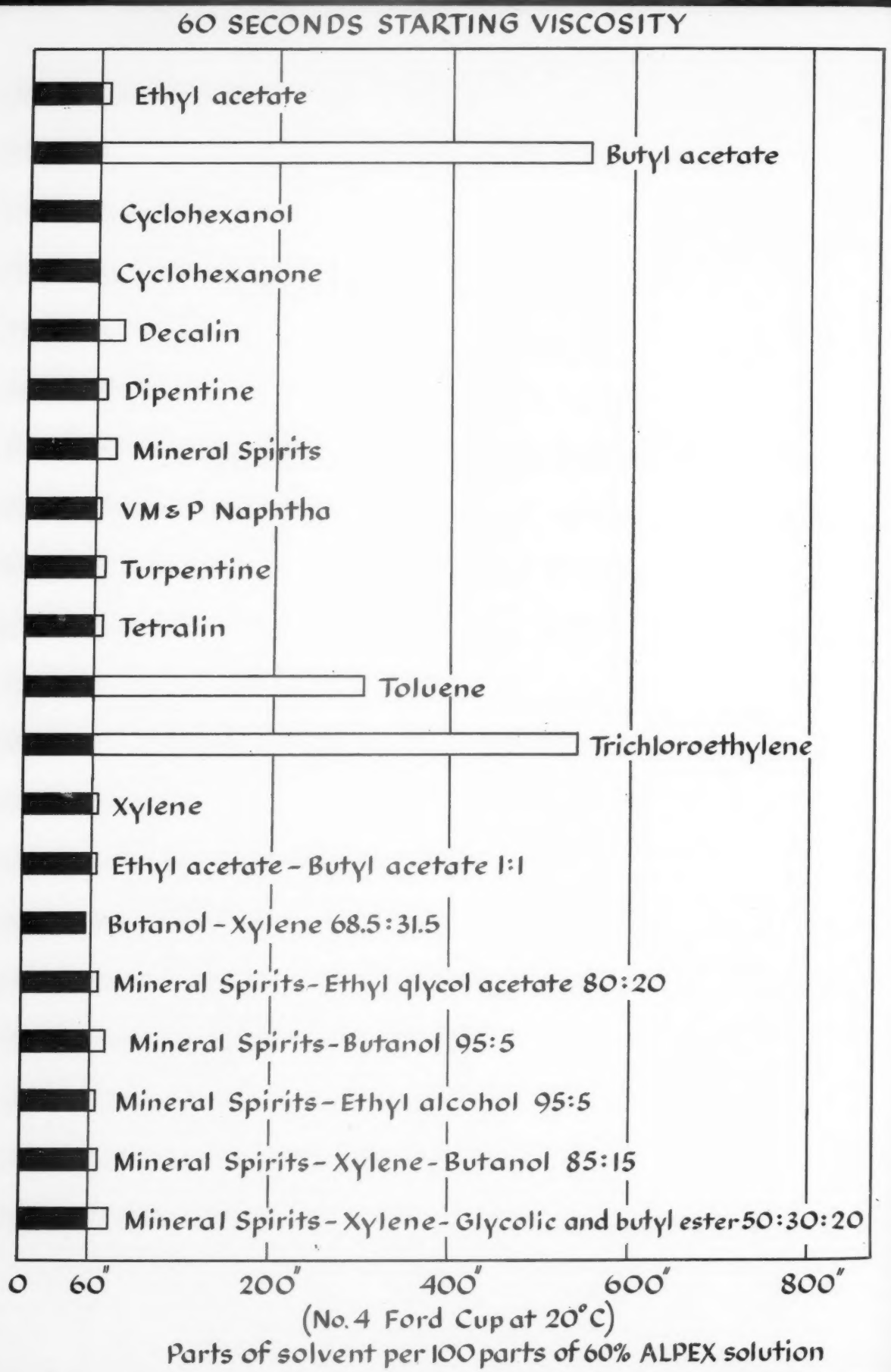


Figure 3. Storage stability of cyclized rubber solutions is influenced by the various solvents. The above chart gives a graphic indication of the viscosity after two years of storage.

plished through the incorporation of small quantities of linseed oil. It is only advisable to use the strong solvents mentioned above if necessary as, for instance, in very highly pigmented coatings.

In normal paint formulations, the use of these powerful solvents should be eliminated because it is a well known fact the they re-soften the ground coat and cause difficulties when the following coat is applied. In general, the good recoatability of cyclized rubber paints is caused through the mild action of mineral spirits having a slow solvent action upon dry films.

It is recommended to apply the paint quickly and recoat after 24 or 48 hours to assure a secure bond between coats. If too long a time elapses between the application of coats, the adhesion of the following coat may be impaired, because films cross-link on aging and become insoluble, especially when pigments causing the acceleration of drying are used. It goes without saying that the design of paint systems and the formulation of the various coats applied are of utmost importance. Through proper variations of pigments and binders, the properties of cyclized rubber paints can be changed to satisfy numerous requirements.

FILM FORMATION, DRYING, SOLVENT RETENTION

After the application of cyclized rubber solutions, drying proceeds physically through the evaporation of the solvent. The solution dries within a few hours, forming colorless, glossy films which are characterized by excellent resistant properties against the action of chemicals. The air drying times of an "Alpex" mineral spirits film under normal conditions are as follows:

Dust free	About 30 minutes
Tack free	About 70 minutes
Through dry	About 3 – 4 hours

The fresh films are still soluble. During the course of aging, films gradually render themselves insoluble in most solvents, due to a certain cross-linking action, which occurs within the film. Complete insolubility occurs only after an aging period of several weeks. Through the use of certain driers, solvent resistance against mild solvents for a short period is obtainable after a few days.

The drying process can be recorded through hardness measurements. These experiments demonstrate the solvent retention, a phenomenon of interest to the coatings engineer. During the film forming process of air drying paints and varnishes, all binders retain solvents in a more or less pronounced fashion. In certain systems it may take years before the retained solvents disappear out of the film. Solvent retention does not only depend upon the properties of the binder, but also on those of the solvent. It is understood that the film thickness has a pronounced influence on the quantities of the solvent retained in the film. Practically, one can differentiate between resins retaining aliphatic hydrocarbon solvents and others which have a stronger retention for aromatic hydrocarbon solvents. Binders forming solutions of high viscosity produce thin films of less solvent retention, whereas binders forming thick and closed films upon drying tend to retain solvents from the beginning.

The cyclized rubber solutions produce thick, closed films, and, therefore, the danger of solvent retention arises, if solvents are not properly selected. Considering "Alpex," the situation is such, that the retention of aliphatic hydrocarbon solvents can be classified as normal, whereas aromatic hydrocarbon solvents are strongly retained meaning that the advantageous use of mineral spirits as a solvent does not cause any difficulties as far as solvent retention is concerned. Caution is indicated if aromatic solvents, especially xylene, are used.

The solvent retention can also be favorably influenced by the use of lower boiling aliphatic solvent fractions or, if indicated, by increasing the viscosity through the addition of polyacrylates. This causes the formation of thinner films, depending entirely on practical requirements.

Figure 4 shows Pendulum Curves of progressive drying of an "Alpex-" mineral spirits solution, in comparison with an "Alpex-"xylene solution. Films were applied to a wet film thickness of 50 microns upon plate glass, and tested with the Albert Koenig Hardness Tester during the drying period and the following aging period under atmospheric conditions. The dry film thickness was 20 microns. Pendulum values decrease at the beginning when the film changes gradually from a liquid to a solid state, and start to increase with progressive hardness of the film. The drying curve of the "Alpex-" mineral spirits solutions demonstrate faster drying and through drying. The other film remains softer due to the retention of xylene. After four weeks drying (Figure 4) it has not obtained the hardness of an "Alpex" film laid down from a mineral spirits solution after five hours. These results are confirmed by gravimetric determinations.

The drying process of cyclized rubber can be accelerated by heat. Drying for one hour at 200° C

Film 24 hours air dry, then heat cured at various temperatures.

Age of coating—days	1	2	4	7	14	1 month	2 months
24 hours air dry	5	5	5	4.5	4.5	2.5	1
24 hours air dry + 1 hour 50° C	5	5	5	5	4	2.5	1
24 hours air dry + 1 hour 100° C	5	5	5	4.5	4.5	4.5	4.5
24 hours air dry + 1 hour 150° C	5	5	5	5	5	5	4
24 hours air dry + 1 hour 200° C	5	5	5	5	5	5	4

Legend: 5 = no change, decreasing numbers indicate decreasing protective value.

In case heat curing is done after 14 days air drying, further noticeable improvements of chemical resistance over long exposure times result.

Age of film—days	1	2	4	7	14	1 month	2 months
14 days air dry	5	5	5	5	4.5	5	3.5
14 days air dry + 1 hour 50°C	5	5	5	5	4.5	4	3.5
14 days air dry + 1 hour 100°C	5	5	5	5	5	5	5
14 days air dry + 1 hour 150°C	5	5	5	5	5	5	5
14 days air dry + 1 hour 200°C	5	5	5	5	5	5	5

Legend: 5 = no change, decreasing numbers indicate decreasing protective value.

Table V and VI. Influence of drying conditions on the chemical resistance of cyclized rubber films in 5% acetic acid solution.

Figure 3. Storage stability of cyclized rubber solutions is influenced by the various solvents. The above chart gives a graphic indication of the viscosity after two years of storage.

accelerated the through dry greatly and improves chemical resistance at the same time. An optimum of hardness and resistance are obtained by heat curing at elevated temperatures, for instance, at 100° C. These results are demonstrated by figures tabulated in Table V and Table VI.

Steel panels are coated with one primer coat and three finish coats. (Primer: "Alpex-"Aroclor 1248—red lead. Finish coats: "Alpex-"Arochlor 1248—TiO_2 and Barytes).

Each paint coat was recoated after 24 hours, and after 24 hours of air dry-baked for one hour at various temperatures.

Test panels were then immersed into a 5% acetic acid solution.

DRIERS AND INHIBITORS

Despite the fact that cyclized rubber reacts in a certain way under the influence of metallic driers, no

(*Turn to page 91*)

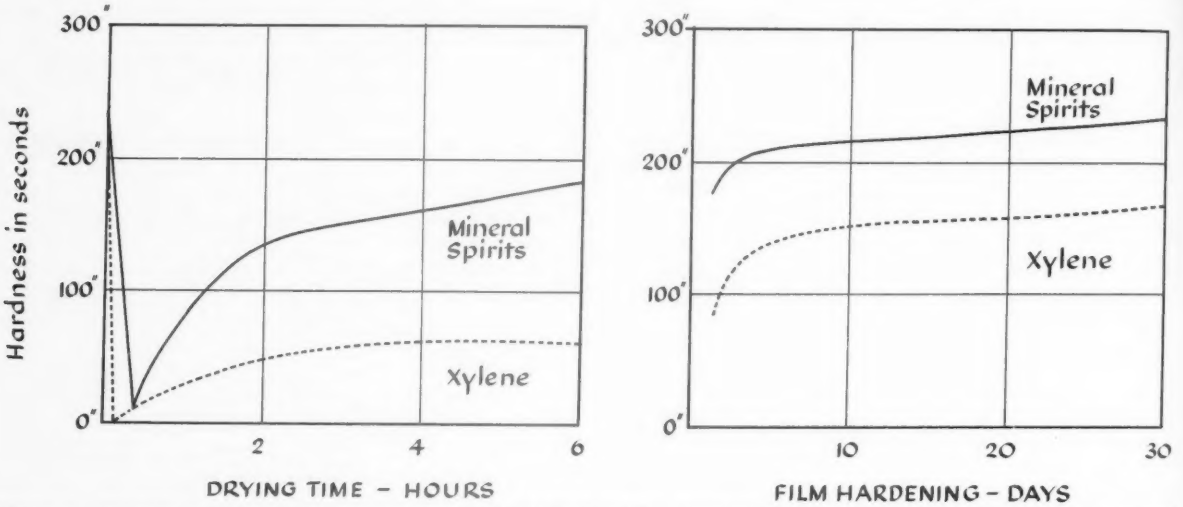


Figure 4. Pendulum curves of progressive drying of cyclized rubber dissolved in mineral spirits compared with cyclized rubber dissolved in xylene.

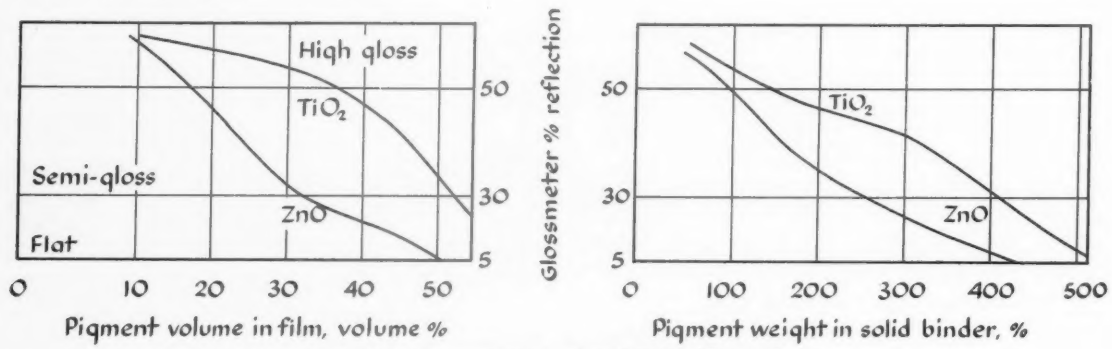


Figure 5. Pigmentation of cyclized rubber paints.

"Alpex" Varnish	Starting Viscosity	Viscosity 7 days	Viscosity 1 month	Viscosity 2 months	Viscosity 5 months
Umbre	77	77	92	91	175
Titanium dioxide	76	77	87	87	107
Zinc White WS	80	85	94	107	113
Zinc Oxide	77	77	96	93	112
Lithopone 60%	78	81	96	94	102
Basic Carbonate of White Lead	77	81	108	119	Hard Settling
Zinc yellow	70	87	98	92	108
Chrome yellow	71	80	102	101	157
Chrome Green	71	80	102	101	Gelled
Iron Oxide Yellow	80	80	107	98	119
Iron Oxide Red	75	80	88	95	108
Iron Oxide Black	77	100	132	153	301

Table. VII. Storage stability of pigmented cyclized rubber solutions. (Viscosity determination—seconds, #4 Ford Cup at 20°C.)

NEW CIBA ARALDITE "7000" SERIES

Through an exclusive process developed by CIBA Research an entirely new range of Epoxy Resins is now in full-scale commercial production. Designed to overcome the deficiencies of conventional epoxies, the ARALDITE "7000" series brings rigidly controlled uniformity to make possible consistently reliable formulations time after time.

ARALDITE® EPOXY RESINS

7071 FOR AIR-DRY CURES

7097 FOR BAKING SYSTEMS

...are ready to step in now and bring these important advantages to you... superior wetting... higher gloss... freedom from crawling and cratering... reduced pigment flocculation and floating.

Note: Sparkling clear solutions of these resins are also available for your convenience.

C I B A

FIRST IN EPOXIES

CIBA Products Corporation, Coating Resins Dept. PVP2-9
116 East 16th Street, New York 3, N.Y.

Please send me further information on the new CIBA ARALDITE "7000" Series.
☐ 7083 for esters ☐ 7097 for baking finishes ☐ 7071 for room-temperature finishes.

NAME_____

COMPANY_____ TITLE_____

ADDRESS_____

CITY_____ STATE_____

In Canada: **CIBA Company Limited,** 548 King St.; West, Toronto 2B, Ont.

In Mexico: **CIBA de Mexico, S. A.,**
Calz. de Tlalpam No. 1779, Apartado Postal 10262, Mexico 21, D.F.

SAVE UP TO 10¢ A GALLON with

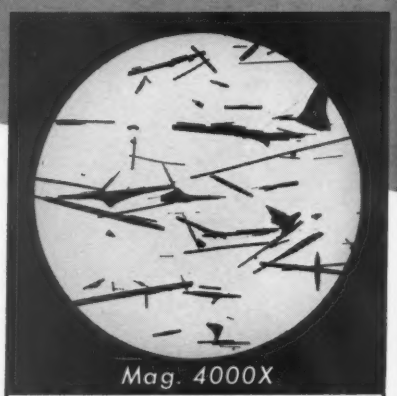
XX-602

(LEAD FREE)

ZINC OXIDE

HIGHEST CONSISTENCY
FULLY ACICULAR

No Colloidal Fines



Mag. 4000X

HORSE HEAD® XX-602 is a major development to help you cut the cost of exterior house paints.

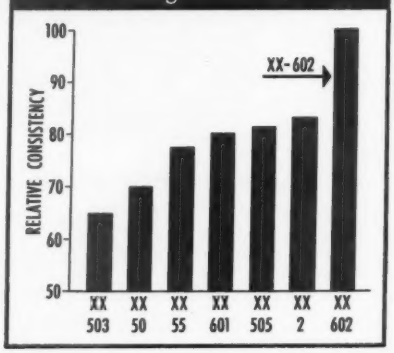
MORE BODY

You need only take advantage of its extra high consistency. Its long, fine needles give house paints as much as 10 K.U. more body than conventional zinc oxides. And XX-602 holds its body in the can exceptionally well because it is free of reactive fines.

REDUCE YOUR PIGMENT CONTENT

Cut back that extra body, if you wish, with additional combined vehicle or thinner . . . and count your savings.

Send for a sample of XX-602 now.



THE NEW JERSEY ZINC COMPANY

Founded 1848

160 Front Street, New York 38, N. Y.

BOSTON CHICAGO CLEVELAND OAKLAND LOS ANGELES

Also Distributed by

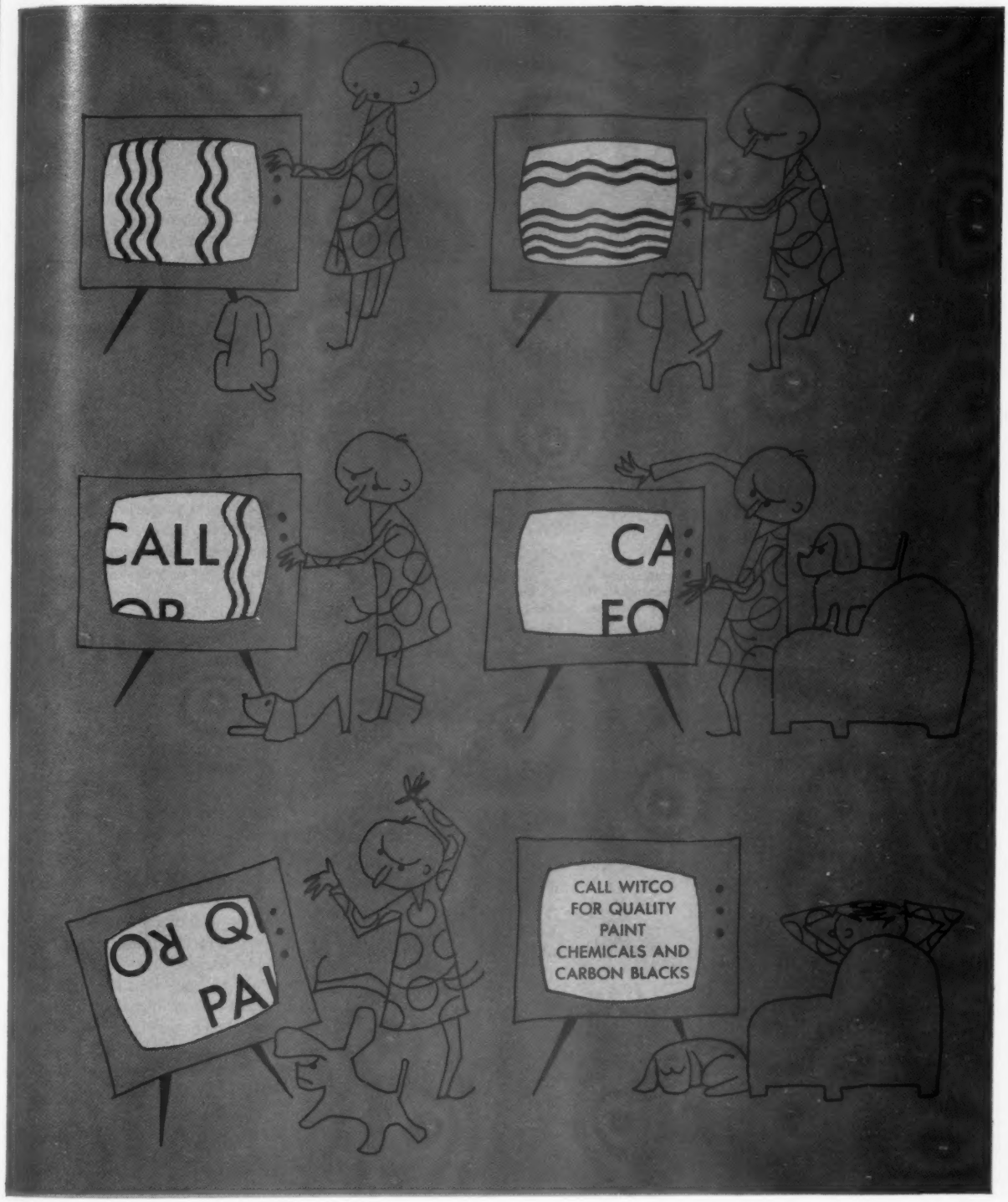
VAN WATERS AND ROGERS

SEATTLE PORTLAND (ORE.) SPOKANE VANCOUVER, B. C. DALLAS HOUSTON

ST. LAWRENCE CHEMICAL COMPANY, LTD.

TORONTO, ONT. MONTREAL, QUE.

HORSE HEAD PRODUCTS ®



Dependable quality, reliable service, outstanding economy...that's what you get when you use Witco paint chemicals and Witco-Continental carbon blacks. And you can combine them for quantity discounts. Write or call...**Witco Chemical Company, Inc.,** 122 East 42nd Street, New York 17, N. Y.

Witco Chemicals for the paint industry include: Stearates • Driers • Extenders • Emulsifiers • Surface Active Agents • Plasticizers • Flatting Agents • Antifouling Agents • Viscosity Modifiers • Phthalic Anhydride • Carbon Blacks – ***Remember Witco...A Growing Source of Chemicals for Industry***

WITCO

Chicago • Boston • Akron
Atlanta • Houston • Los
Angeles • San Francisco
Oakville, Ontario • London
and Manchester, England

By
Phil Heiberger

The author continues his random reflections on various aspects of the paint industry. The opinions expressed in this column are his alone and do not necessarily reflect those of this publication.

Capsule Reading

THE editors of the American Chemical Society's applied journals are in the midst of a vigorous campaign to promote better reading habits. A typical argument goes as follows: "There is a reading crisis. Too many people are not reading as they should. They are getting their information, their fitness for the job ahead in bits and pieces. On the radio. On TV. In bulletins, 'digests,' 'pocket books.' "


P. Heiberger

Now I certainly would not want to go on record as one who disagrees with the ACS. It is true that when readers depend only upon "bits" and "pieces" they miss much important information, often mistaking the trimmings for the meat. However, when tidbit and capsule reading are regarded as a supplement to the more substantial kind, then the real value is appreciated. It's amazing how many doors and windows can be opened by "bits" and "pieces" from here, there, and everywhere.

In view of the fact that no one person could possibly make much more than a small dent in the enormous mountain of reading matter available to the serious reader, and that most readers tend for good reason to confine their reading to two or three fields of particular interest, these "bits" and "pieces" often provide a helpful and welcome link from the narrow confines of one's specialty to the outside world. Sometimes they can stimulate interest in new areas and introduce one to a whole realm of ideas. And sometimes, surprisingly, they can inform one about something in his very own specialty that seems strangely to have escaped his notice.

Such was the case when I picked up the December 1958 *Reader's Digest* and spotted an article by Wilbur Cross condensed from *Chemistry*, entitled, "Paint It Yourself—Thanks to Dr. Ryden." There I learned for the first time that the latex paint industry owes much to the work of Dr. Laurence Ryden. This was news also to many of my colleagues, some of whom have been closely associated with latex paint for many years.

This article has attracted much attention and is an excellent argument supporting the idea that good advertising should center its copy around individuals who have made significant contributions to the development of new concepts instead of sticking in the rut of time-worn and boring repetitive and meaningless claims and counterclaims.

Latex in Archeology

A similar situation occurred while I was looking through a children's book, *The Wonderful World of Archeology*, with one of my youngsters the other day. Archeologists, I learned, have long used papier mache to take squeezes or impression of inscriptions and old monuments. Now they can use liquid latex rubber which, when dry, gives a clearer impression, lasts longer, and is easier to move about.

Sensitive Research

THE current "I-can-do-anything-you-can-do-better" race between the U.S. and the U.S.S.R. has the whole world guessing. And it has propelled many a scientist from his comfortable English language scientific journals to the more thorny Russian journals for words of wisdom. In tune with the times, my eye caught an item of international interest. It has been reported in the *Journal of General Chemistry* (USSR) *27*, 1798 (1957) that the odoriferous principal of garlic has been isolated. To many paint people it is an old friend in a new form—diallyl sulfoxide. This could well set one to wondering how some of our long-winded oratorical friends on Capitol Hill will interpret this discovery.

Shifting Targets

TO shoot at a sitting duck is one thing, to hit a moving one is something else again. An awareness of the difference between these two problems can change the entire

complexion of a matter and even spell the difference between success and failure.

Think of a paint formulator who keeps on trying and trying to improve his product. He tests it in the laboratory. Results are excellent. But when the exact same product goes into production and actual use, results are far from satisfactory. Mistakenly, he concentrates harder and harder on his paint product in an effort to discover the cause of the discrepency. And that is just the moment when he may be sighting the wrong target.

Evidence abounds that the paint itself may be flawless even when it fails to perform as expected. More and more it seems that the real culprit is polluted air. Pollution caused by dust particles, by microorganisms, or by chemicals, can disturb normal film formation and inhibit the protective properties desired for the paint.

Three such examples were recently noted.

Dust

C. Groff Baker [*J. Appl. Chem.* (London) *8*, 590 (1958)] measured the electrical resistance of varnish and paint films and found discontinuities. These discontinuities were found to be due to the inclusion of dust particles; furthermore corrosion to the steel substrate was initiated at the point of discontinuity. Varnish films prepared with precautions to exclude dust gave exceptionally good protection to steel. In addition, the electrical resistances of the dust free films were much higher than the films prepared without precautions.

Chemical Pollutants

O. Vanicek, V. Civin, and V. Taborsky [*Chem. prumysl 7*,273 (1957); (*Chem. Abstracts 52*, 14189)] exposed several red lead primers to ammonia, hydrogen chloride, sulfur dioxide, and hydrogen sulfide. The drying of a red lead in linseed oil was highly inhibited by SO_2, H_2S, and NH_2. H_2S markedly inhibited the dry of both linseed oil modified alkyd and tung oil modified with coumarone resin. In the case of the red lead in linseed oil, hardly any dry was observed in the H_2S atmosphere. The concentrations of the gases were as follows:

So_2 – .1%
HC1 – .001 to .002 %
H_2S – .01 %
NH_3 – .5 %

Microorganisms

K. E. Parry and R. K. S. Wood [*Ann. Appl. Biology 46*, 446 (1958)] found that by growing mycelium of Botrytis cinerea in media containing progressively higher concentrations of copper sulfate, a strain was produced which grew at a concentration of 750 ppm. The resistance of the mycelium, and to a lesser extent of the spores, was retained after growth of the resistant strain for six months in fungicide free media.

Attempts to produce mercury chloride resistant strains failed but resistant strains were developed to phenyl mercury acetate.

Candid Advertising

IT is very refreshing once in awhile to read an advertisement that smacks of sincerity, conviction, and unvarnished truth. One item that caught my eye was a statement in a flyer called *The Sonic Pulse* put out by the Sonic Engineering Corporation. Under the heading "We'd rather not get mixed up in this dirty business . . ." we read:

"We're pretty good in carbon black dispersions, but if you have this kind of a problem we'd much rather you kept it to yourselves. It took us two days to clean up after the last carbon black test, and as innocents in this dirty game, we have not yet learned to approach it with the gay abandon of those who are in touch with it all the time. However, if you really need a test, contact our president. He will refer you down in the line to some lab assistant who has never heard of carbon black. Things may look black for both of us when we're finished, but you'll have the finest carbon black dispersion you ever saw."

More on Ultrasonics

Ultrasonics is being mentioned more and more often nowadays. Kl Edelmann reports his work on polymerizing acrylonitrile ultrasonically. [J. Polymer Science *29*, 531 (1958)]. Ultrasonic waves can split water molecules into H and OH radicals. Since the polymerization of acrylonitrile is initiated by free radicals, polymerization occurs if aqueous acrylonitrile solution is treated with ultrasonic waves. Because of the low solubility of acrylonitrile in water, concentrated acrylonitrile solutions in dimethylformamide were mixed with varying amounts of water. Apparently the OH radicals generated by the ultrasonic waves initiated the progress polymerization which took place as long as the OH radicals were present, i.e., as long as the ultrasonic waves last.

For details and mechanisms, see the original paper "Uber die Ultraschall-Polymerization von Acrylnitril."

Fire Fighting Paints

PAINT formulators use vast quantities of extender pigments and moderate amounts of water soluble thickeners in their latex paints. We know that these compounds are used in other applications such as textile and paper treatment, cosmetic and pharmocological preparations, cleansers, etc. But recently we learned that they help fight fires.

Working under a project sponsored by the Navy's Bureau of Yards and Docks, C. S. Grove, A. R. Aidun, and E. J. Walker of the University of Syracuse (*Chem. Eng. News*, Oct. 20, 1958). They believe that more viscous water will be a more effective cooling agent and more opaque water will reduce the danger of the fire spreading by radiant energy.

Since water puts out fires by lowering the temperature of the burning material below the combustion point, increasing viscosity prolongs this cooling process. Intense heat causes ordinary water to vaporize; therefore, the cooling powers of ordinary water diminish. But more viscous water produces a thicker film of water which resists vaporization better. Water soluble high molecular weight cellulose derivates make the water more viscous. Talc and clay increases the opacity. This additive-treated water puts out fires in less than one tenth the time required by ordinary water.

Use ROALOX

Burundum-Fortified

GRINDING JARS

and watch

GRINDING COSTS GO DOWN!

Here's Why—

LONGER WEAR-LIFE

Special wear-resistant porcelain is fortified with Burundum — our high density grinding media. You get more than twice the wear-life of conventional porcelain jars.

GREATER STRENGTH

Higher impact resistance reduces breakage hazards. Less chipping at lip and lid edges in handling.

LESS CONTAMINATION

Lower silica content and increased wear resistance means much less contamination of your product.

SAVES TIME

Extra wide mouth speeds loading and discharging. Lid and lid lock are one integral unit for quick, easy opening and closing.

OTHER IMPORTANT ADVANTAGES

Simple, positive locking. Rugged, heavy-duty hardware. Neoprene gaskets resist oil, chemicals, and many solvents. Optional draw-off lids.

HANDY HINTS ON MILLING

To get peak efficiency from your mills use "U. S." Burundum Grinding Media. Hard, tough, long-wearing, its high specific gravity and tubular shape give higher grinding efficiency with less milling time per batch.

For valuable milling data and complete description of "U. S." Grinding and Mixing Equipment, WRITE FOR BULLETIN 280.

EIGHT SIZES: ½ pint, ⅓, ½, 1⅓, 2⅓, 3½, 4½ and 6½ gallons. Steel or stainless steel jars also available in these sizes, unlined or lined with low-ash rubber or neoprene.

PROCESS EQUIPMENT DIVISION

OUR 100th YEAR

U. S. STONEWARE

AKRON 9, OHIO

349-F

PRODUCTION

PACKAGING

MATERIAL HANDLING

NEW EQUIPMENT and MATERIALS

Regular maintenance of production equipment can go a long way in controlling costs. For details, see page 61.

now! the most important new can development of the century!

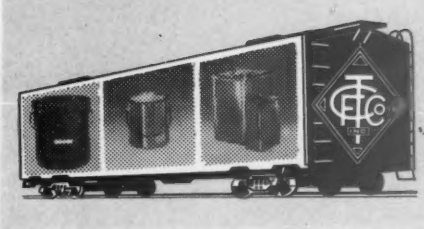
FEIN'S NEW "SHELF-LIFE"

2 GALLON LUG COVER STEEL PAILS

INCREASE SHELF-LIFE BY 300%

New filling line cuts down air space!

Now... a great new triumph in pail development! The new "SHELF-LIFE" pail designed by Fein's engineering and research departments with the close cooperation of over thirty of the paint chemists associated with leading manufacturers. Tests run by your chemists have proven that the use of this new pail will increase the resistance to skinning of alkyd, odorless, and other paints prone to skinning at least 300% as compared to previously manufactured 2 Gallon pails. Fein's new "SHELF-LIFE" pails raise the filling line to reduce air space... and keep your profits from "skinning" away!



FEIN'S TIN CAN CO., INC.

50th STREET & 1st AVENUE, BROOKLYN 32, N. Y.

Telephone: STerling 8-2200

PHILADELPHIA AREA OFFICE.....The Benson, Jenkintown, Pa., WAverly 4-5022

SALES OFFICES Baltimore, Cleveland, Cincinnati, Boston, Columbus, Miami, Jacksonville, Chicago, Detroit, St. Louis, Philadelphia, Pittsburgh and Smith Can Company in Atlanta, Georgia.

AFFILIATED FIRMS

ATLAS CAN CORP.....Brooklyn, New York

PEERLESS CAN CORP.....Brooklyn, New York

COMMERCIAL CAN CORP.....Newark, New Jersey

STANDARD CAN CORP.....Leetsdale, Pitts., Pa.

APPROACHES to CUTTING COSTS

By
Lawrence Shatkin*

MATHEW J. Beecher stated that "when costs rise, profits cannot keep pace with higher volume. At the same time customers demand competitive, prices, superior quality, improved service. The resulting squeeze forces plants to eliminate waste—in whatever phase of operations—through accurate forecasting, price scheduling, and firm yet flexible controls."

Controlling costs is a management job that never ends. It becomes more important during a profit squeeze. However, before one organizes a cost reduction program, he should have some indication from past records what costs have been incurred, whether these figures be ratios, comparisons, or aggregates. The main purpose is to stimulate action. It is only when concerted effort is applied from top management to the first line supervisor that any decrease in costs take place. We know that costs do not tend to decrease or level off; they are not static; they go in one direction, and that is upward—unless checked.

Purchasing

With purchasing responsible for the largest portion of the cost pie, any opportunity for cost reduction could possibly have a tremendous impact on the profitability of the company. If one were to analyze their largest volume raw material purchases, you could easily project what savings would take place if the raw material were lowered a fraction of a cent. It means that the purchasing department must be constantly aware of new or better products reaching the market. Purchasing agents should be more than bargain hunters. Their work should embrace a creative approach, by bringing new ideas or innovations to other department heads.

The purchasing department should be cognizant of more economical purchasing through larger unit loads, or through combination purchasing of several items from one vendor. Additional savings would take place through lower freight charges, based on the larger unit load.

Occasionally, substantial savings take place through the offerings of odd lots from jobbers. However, it is very important that the material be checked to ensure quality. Any sacrifice of this characteristic would not only cancel out the price advantage but could possibly destroy the reputation or corporate image in the minds of the consumer. This image takes a long time to create, and should be guarded at all times.

It is the purchasing agents' responsibility and duty to challenge or question anything that does not look like value received. Purchasing is not only a service that affects every other department, but, an activity affecting profitability, and its responsibilities concern both the raw material and finished product. A purchasing agent should be receptive to suggestions from raw material suppliers, and use his judgment and experience in deciding what should be filtered through.

An area of materials often neglected are sundry items. These add

Economical purchasing of raw materials is one way to control costs.

The opinions expressed in this feature are not necessarily those of any particular firm or organization.

Maintaining paint production equipment in good working condition is important in controlling operating costs.

up to a substantial figure over the course of a year. Such articles as gloves, wiping rags, cups, and masks are essential to a paint plant, and it may be worthwhile to check alternate sources of supply. In 1954 one company used 11,000 pounds of colored wiping rags, which usually were discarded. After investigation by the purchasing department, an arrangement was made with a company whereby the soiled rags were picked up, rewashed, and returned at approximately half the original price. The savings realized approximated eleven hundred dollars ($1100) for the year.

The importance of "value analysis" has been introduced by many companies, Value analysis is a scientific approach aimed at getting the same or better performance by removing costs without any deterioration in quality. It is really a philosophy; a way of thinking and observing conceptually. It can be applied to all functions of a business and used by all companies.

In order to ensure that purchasing activities are directed toward company objectives, the purchasing manager should set up some goals and yardsticks whereby his performance can be measured. His work can be coordinated with the technical department by setting up sub-goals to which both departments can work toward. These activities will lend for self-control and ensure that action will take place in the most important categories.

Maintenance

With increasing mechanization and automation, maintenance should receive consideration as a function toward controlling and lowering operating costs. Data and checklists are useful up to a point. What is important is to show top management that x dollars spent for maintenance saved x plus y dollars in operating costs.

In many instances "breakdowns"

WEEKLY (check when completed)

Department	Equipment	Function	First Week	Second Week	Third Week	Fourth Week
Grinding	5-Agitators	Oil and grease				
	Labeling Machines	Oil Motor				
Filling	New Elgin Filling	Oil and Grease				
	Old Elgin Filling	Oil and Grease				
	Oil Color Filling	Oil and Grease				
Shipping	Bowser Varnish Filling Machine	Oil and Grease				
Varnish	Condenser (Fume Control) Water Pump Motor	Oil Motor				
	Blower	Oil Motor				

Table 1. The above schedule is an example used for checking the maintenance of production equipment.

bring the maintenance man or department into action. A deliberate, well planned, preventative maintenance program should be considered, where periodic inspections are carried out, and corrections made before a "crisis" occurs. It is necessary to inculcate into the minds of all supervisors and workmen the idea that the prevention of breakdowns and consequent loss of production is a prevention of loss not only to the company but to the workers as well.

Someone should be assigned the task of drawing up maintenance schedules to include: building and grounds, machinery, washrooms and garbage disposal, electric fans and lighting fixtures, unit heaters, boilers, etc.

For checking paint production equipment a proposed weekly scheduled is given in Table I.

Budgets

Budgetary control is an important part of the planning technique in seeking to control and reduce burden costs. This type of control has grown in industry and is due to the growth of the scientific method. There are three types of budgets: continuous budget, periodic budget or a combination of both. It is sufficient to state that all have their merits, and their chief value is realized when one is adapted to that particular type of business where it can be used. The chief objection to budgeting has been psychological and does not exist in many organizations for that reason. A successfu budgeting program depends upon the cooperation of all the executives, and they must be made to understand its objectives.

In the areas discussed above, we outlined methods to reduce the cost of a product without sacrificing product quality or employee safety. Business has become so complex, that only a well laid plan can cope with and bring together the several functions of business activity. This planning must be a continuous process, measured in terms of a dynamic society.

ASBESTINE 325

64 YEARS of production have paid off for International Talc Co. and its customers As the world's largest producer of magnesium silicate, International Talc Co. announces the availability of their newest member to the family. . . . Asbestine - 325

★ THIS NEW PRODUCT FEATURES

Good dispersion with minimum use of oil needed in grinding. . . . enables formulating at higher pigment volume concentrations. Thereby. . . .

REDUCING RAW MATERIAL COSTS

without affecting performance of storage characteristics.

Also available in other grades. . . .featuring these advantages

- **1. Available in low, medium and high oil absorption**
- **2. Pure white — suitable for white or colored paints**
- **3. Acicular structure affords good suspension**
- **4. Mixes readily in all paint vehicles**
- **5. Contributes to greater durability in exterior paints**
- **6. Excellent flatting agent for flat or semigloss coatings**
- **7. Uniformly low moisture content (less than .5% loss at 212°F.)**
- **8. Bulking value 4.2 gallons per 100 lbs.**
- **9. Packed in 50 lb. paper sacks for your convenience**

PRODUCT OF

INTERNATIONAL TALC COMPANY, INC.

WORLD'S LARGEST PRODUCERS OF TALC

ESTABLISHED 1893

90 WEST ST., NEW YORK, N. Y.

INTERNATIONAL TALC CO., INC.
90 West St., New York 6, N. Y.

Please send FREE Sample and Technical Data on ASBESTINE 325.

Name.....
Company.....
Street.....
City.....State.....

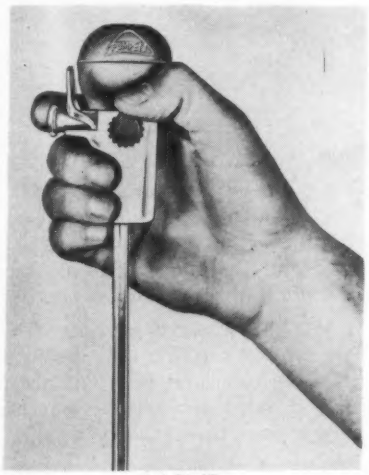
SEND COUPON FOR FREE SAMPLE AND TECHNICAL DATA ABOUT

ASBESTINE 325

S. W. Tuttle, Vice-President

NEW EQUIPMENT AND MATERIALS

This section is intended to keep our readers informed of new materials and equipment. While every effort is made to include only reputable products, their presence here does not constitute an official endorsement.



LAPINE

PIPETTING DEVICE
Eliminates Mouth Suction

Pipetting device, the Pumpett Automatic Pipette Control, said to make it unnecessary to fill a laboratory pipette by mouth suction, which can be dangerous as well as distasteful.

The Pumpett is designed for operation with one hand, either right or left. The thumb presses a large rubber bulb at the top to provide suction, and the forefinger operates the coarse air control valve. For micro quantities, a small internal rubber bulb, depressed by a control knob screw, can be operated independently. The operator keeps liquid under constant oberservation at eye level.

All sizes of pippettes can be accommodated, even microcapillary, in the rubber-lined chuck jaws. Pipettes need not be touched by hand at all. The Pumpett is especially recommonded for safety where corrosive, toxic, or infectious liquids and sterile or radioactive solutions are handled.

The Pumpett consists of an acid-resistant molded plastic body surmounted by a surgical-grade rubber bulb. This body houses the stainless steel mechanism which operates the chuck jaws. The Pumpett can be completely dismantled for cleaning and sterilizing if contaminated, and quickly reassembled.

Arthur S. LaPine and Company, Dept. PVP, 6001 South Knox Avenue, Chicago 29, Ill.

FILTER CARTRIDGE
Easier Cleaning

New type of filter plate called the "Wash-Off" cartridge for use in the firm's standard horizontal plate filters has been announced.

SPARKLER

These "Wash-Off" plates are assembled as a removable cartridge similar to the standard horizontal plate type, but when removed for cleaning it is not necessary to disassemble each plate to remove the spent cake and filter paper to prepare for replacement. Claimed that the complete plate cartridge can be cleaned as a unit and returned to the tank for use in a fraction of the time required to clean individual plates.

New filters can be supplied equipped with the new "Wash-Off" plate cartridge or the cartridge only can be furnished for existing horizontal plate filter tanks.

Sparkler Manufacturing Co., Dept. PVP, Mundelein, Ill.

DRUM HANDLING ATTACHMENT
Eliminates Pallets & Dunnage

"Liftomatic" drum handling attachment that can be used interchangeably with the firm's line of electric fork trucks has been developed.

The "Liftomatic" drum handling attachment is a mechanical unit claimed to engage, transport, place and tier any conventional type drum without the use of pallets or dunnage. Because the clamping mechanism is adjustable from 35" to 14", any size drum regardless of height, diameter, head or rim size can be handled. The jaws, too, can operate perfectly on steel, removable lid, fiber or light guage (disposable) metal drums either opened or closed.

No additional controls are necessary since it is a mechanical unit. The clamping mechanism consists of an outer and inner housing—the inner housing is spring actuated and

LEWIS-SHEPARD

has an upper and lower jaw. The fork truck operator merely approaches the drum; the inner

housing is pressed in until the outer housing touches the side of the drum. Then by raising the carriage the jaws of the Liftomatic automatically grip the rim of the drum and is ready for transporting. To remove the drum, operator lowers drum to the resting surface and continues to lower truck carriage until both jaws have retracted.

The unit is quickly detachable. One man can attach in 2-3 minutes without the use of tools. There are no nuts or bolts.

Lewis-Shepard Products, Inc., Dept. R8-31-PVP, 125 Walnut Street, Watertown, Mass.

SPRAY DRIED PVA
Reconstituted by Adding H_20

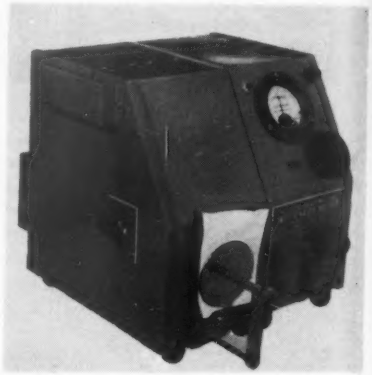
A spray dried polyvinyl acetate resin has been introduced.

Called Darex ESD (for experimental spray dried), is easily reconstituted by adding water. Now available at 47 cents a pound in truck load quantities.

The dehydrated emulsion, which can be used in place of liquid vinyl emulsions wherever presence of water is undersirable, is expected to find wide use as an additive in dry mixes specialty portland cements, as a vehicle for industrial paints, as an adhesives base, and in many other applications.

A white powder, Darex ESD cuts freight costs for users, can be stored indefinitely, is unaffected by freezing, and can be mixed as needed where small batches are prepared at a time.

Dewey & Almy Chemical Division, W. R. Grace & Co., Dept. PVP, Cambridge, Mass.



HUNTER

SURFACE AGENT
Corrosion Inhibiting

Cationic surface active agent, RD-2873-P is claimed to display excellent corrosion inhibiting, bactericidal and foaming properties.

RD-2873-P is a 40 per cent active isopropanol solution that is soluble in water, benzene, hexylene glycol and carbon tetrachloride. It has a pour point of less than 0°F.

The chemical effectively reduces corrosion of steel in water systems. Small additions of RD-2873-P to aerated solutions prevents rusting or etching of mild steel cylinders at room temperature, whereas specimens in untreated solutions become heavily rusted.

RD-2873-P effects nearly complete control of microorganisms found in cooling water. Total growth inhibition in a mixed culture of algae was obtained with 0.01-0.02 per cent of the chemical.

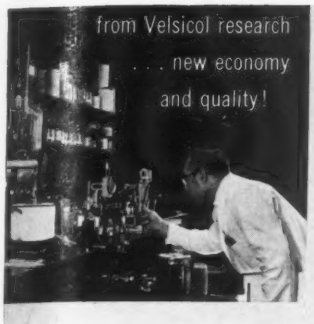
Aqueous solutions of RD-2873-P produce large quantities of stable foam. Hard water, high salt concentrations and varied solution temperatures show only slight effect on volume and stability of foam.

Armour and Company, Chemical Division, Dept. PVP, 1355 West 31st Street, Chicago 9, Ill.

COLLOIDAL SILICA
For Water Base Paints

Nalcoag, a colloidal silica, now available.

May be used to retard aging,



VELSICOL W-617

Hydrocarbon Resin Emulsion

helps more people use emulsion paint more often!

NEW! W-617 EXPANDS YOUR SALES POTENTIAL!

Women like to redecorate. But they don't like to compromise with quality. And there's always the budget to consider. With Velsicol W-617, you can remove the quality and budget limitations on your market, and sell more emulsion paints. W-617 maintains high standards of scrubbability, flexibility, and freeze-thaw, but cuts raw materials costs way down!

NEW! W-617 MEANS BIG RAW MATERIALS ECONOMIES!

W-617 is a low cost water dispersed film former. W-617's low cost makes it ideal for use as the sole film former in the production of white and pastel shade flat paints. Used with styrene butadiene or acrylic latices, it maintains quality while drastically reducing cost. Used in place of alkyd resins, as a modifying agent, it provides greater scrub resistance at lower cost. Raw materials savings become overall production savings, too, because W-617 is versatile and easy to use in emulsion paint formulations.

NOW AVAILABLE IN COMMERCIAL QUANTITIES! FOR TECHNICAL INFORMATION AND TEST SAMPLES, MAIL THIS COUPON TODAY!

LOOK FOR THIS MAN

. . . your Velsicol representative, who can help you make better products for less!

VELSICOL
CHEMICAL CORPORATION
330 E. GRAND AVE., CHICAGO 11, ILL.

International Representative: Velsicol International Corporation, C.A. • P. O. Box 1687 • Nassau, Bahamas, B.W.I.

MAIL THIS COUPON TODAY!

VELSICOL CHEMICAL CORPORATION
330 East Grand Avenue, Chicago 11, Illinois

- ☐ Please send a sample of W-617 for pilot plant use.
- ☐ Please have a salesman call.
- ☐ Please send technical literature.

PVP-29

Name_____

Company_____

Address_____

City_____ Zone___ State_____

provide resistance to soiling, and impart high thermal stability to fireproof paints. Use as a wetting and flatting agent is proposed.

In addition the company says the characteristics of the product indicate that coating a surface with Nalcoag before painting will result in a smoother surface and better adherence of paint.

National Aluminate Corp., Dept. PVP, 6216 West 66th Place, Chicago 38, Ill.

HAND CLEANER
For Dermatitis Problems

New hand cleaner said to easily remove oil, paint, caulking compounds, and ink.

Liquid hand cleaner obviates the use of solvents for cleaning the skin. Protective ointments are not necessary with this cleaner.

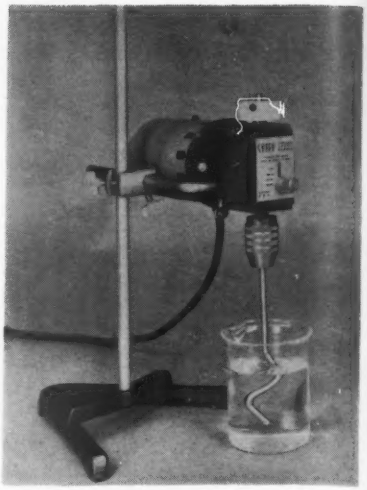
Can be washed away with cold water.

Lixoil Laboratories, Dept. PVP, 176 Federal St., Boston 10, Mass.

STIRRER
Variable Speed

Laboratory motor stirrer said to be capable of stirring highly viscous liquids at high or low speeds.

Variable speed unit provides consistent stirring action at selectively controlled speeds ranging all the way from 100 to 1500 rpm.



CENTRAL SCIENTIFIC

Speed is regulated easily by a control knob on the face of the 1/50 hp induction motor, without governor or rheostat.

Powerful stirring is claimed to be accomplished by a high torque transfer which permits the stirring of viscous liquids at full speed. The torque increases when speed is reduced, thus providing added power when it is needed most.

The stirrer is equipped with a three-jaw Jacobs' type chuck for quick change of metal or glass stirring rods ranging from 1/4 to 3/8-inch diameters. The selected stirring rod is mounted in a hollow shaft with unique gripping and centering mechanism which helps maintain alignment, reduces whipping, and permits fast and easy adjustment to any desired height.

An added feature of the new stirrer is a special rod for mounting in a right angle clamp on the support stand. This method of support permits pivoting of the unit for stirring at various angles.

The induction type motor contains no spark-producing brushes, thus eliminating danger of explosions. The motor operates on 115 volts, A. C., 50/60 cycles.

Central Scientific Co., Richard S. Smith & Associates, Dept. PVP, 176 W. Adams St., Chicago 3, Ill.

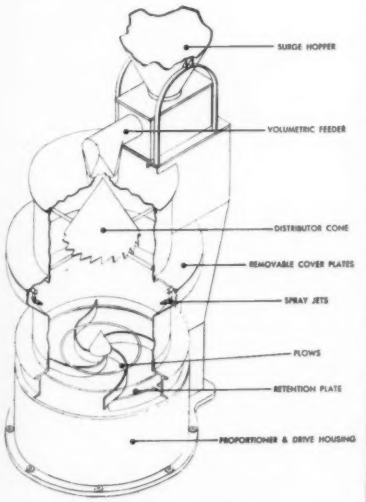
CONTINUOUS BLENDER
Dry or Liquid-Dry Mixtures

Continuous-flow blender has been developed that is claimed to accurately proportion, mix, blend, and discharge a wide range of dry

materials. Also blends liquids with solids in precise quantities.

Materials to be treated or blended are fed proportionately into the blender, called Verticone, via controlled volumetric feeding equipment onto the apex of a cone. This cone is the first step in blending of solids as it causes the material to form a circular, falling curtain as it leaves the base periphery of the cone.

At the base of the cone, spray headers can be provided to disperse any desired liquid into the mixture in any proportions required. Liquid is sprayed on the blended dry material from both inside and outside the curtain as it falls onto a retention plate.



JOHNSON-MARCH

In applications where only solids are blended, effective and economical dust control can be provided by conditioning with Compound MR solution. Controlled wetting in the Verticone is achieved with as little as a fraction of one percent of moisture, or it may be precisely adjusted and metered to add any specific volume of moisture desired.

The complete unit with feeder can be supplied with a common base and can be located indoors or out. Winterized equipment is available for year-round operation in areas where temperatures fall below freezing.

The Johnson-March Corp., Dust Control Engineers, Dept. PVP, 1724 Chestnut Street, Philadelphia 3, Pa.

DUST COLLECTOR
For Large Bulky Volumes

High-efficiency cyclone separator, operating in the 2,000-3,000 cfm range, has been introduced.

Designated Model No. 24, the new cyclone is specially designed to handle large volumes of bulky dust. Its new self-cleaning radial fan design said to give high performance at low horsepower requirements. The 24 FM model is designed for outside exhaust. When it is desired to save heat and recirculate cleaned air, FB models equipped with cloth after-filter bags are also available.

In laboratory tests, the model has separated by weight 99.8% of steel grindings, 99.5% of sawdust and 84% of fine corn starch particles.

Operated by a 7½ horsepower motor, the No. 24 has a 10-inch inlet and 12-inch outlet. The standard series 24 base contains a convenient pull-out drawer with 9 cubic feet storage capacity. Extra large storage bases are available in any size, built to order.

Torit Manufacturing Company, Dept. KP-PVP, Walnut and Exchange Streets, St. Paul, Minn.

ENVIRONMENTAL CABINET
For Varied Conditions Testing

A walk-in type environmental cabinet has been made available.

The unit was designed to enable

NEW MATERIALS — EQUIPMENT

the firm to test components under a wide range of temperatures and humidity conditions.

The temperature humidity cabinet contains 216 cubic feet of area. It is constructed entirely of metal eliminating any drop in efficiency caused by deterioration of wooden parts. Stainless steel exterior and Monel metal interior is fully resistant to corrosion. Noteworthy, too, is the unique, angled inside ceiling which prevents moisture that may collect there from dropping into test specimens. Vaporproof light has external switch. Dual blowers give even air flow throughout the chamber.

The double-walled door and extra Fibreglas insulation used throughout are designed to maintain variable temperature and humidity conditions, approximating plus or minus 2 degrees accuracy. Door is equipped with Thermopane window and special silicone gaskets. Actual range of temperature is from 0°F to 200°F and humidities of 15% to 98%. Oversized components are used to provide performance in excess of specifications.

The cabinet incorporates its own humidity steam generator complete with recorder-controller programmer for recording and controlling varying temperatures and humidities over a pre-determined period. The special dual controls are also designed to anticipate load fluctuations more rapidly than with regular control systems.

Hudson Bay Co., Division of Labline, Inc., Dept. PVP, 3080-82 West Grand Ave., Chicago 22, Ill.

REFLECTOMETER
Measures Whiteness

Instrument designed to measure the whiteness, reflectance, yellowness, and opacity of white and near-white paints and plastics.

It can be equipped with an ultraviolet absorbing filter which may be alternated between the incident and viewing light beams to measure directly the contribution of the widely used fluorescent brighteners to specimen whiteness. Instrument uses paired vacuum tubes in a null Wheatstone bridge circuit. It employs a 45°0° geometry and has green and blue tristimulus filters each with a separate pair of phototubes.

Instrument is built in two sections identical in size and shape so that when bolted together they form a small compact unit. On the left side are the light source, phototubes and 2¼" round specimen viewing area. On the right side are the measuring circuit, vacuum–tube galvanometer and digital dial. When desired, these two sections can be separated by the cable length between them for convenience of sample presentation.

Hunter Associates Laboratory, Inc., Dept. PVP, 5421 Brier Ridge Road, McLean, Va.

PLASTIC FAUCET
New Type Polyethylene

New type of polyethylene has now made it possible to produce a polyethylene plastic drum faucet that will not stress-crack, break or leak.

It is said to have the ability to withstand punishment that no other plastic to this date has been able to match.

Plastic faucet will not react with your chemical products, rust or corrode. It seals hand-tight without need for a wrench and has no-drip threads between the barrel and the body of the faucet.

Multi-Meter Corp., Dept. PVP, 1041 Custer Drive, P. O. Box 6594, Toledo 12, Ohio.

New Developments

Longer Lasting Du Pont Acrylic House Paints

A new house paint that is entirely different from the oil type coatings used for centuries and at least 50 per cent more durable was announced by Dr. C. W. Theobald, research director of the Du Pont Company's Fabrics and Finishes Department.

Described as a great advance in paint technology, the new house paint—an acrylic emulsion—provides several important advantages in addition to longer life. Recommended for use in combination with a special primer, also announced, over bare or burned off wood, it is capable of providing unprecedented protection against blistering. Application by brush or roller is so easy that users are warned to resist the temptation of spreading beyond the recommended rate of 600 square feet per gallon.

Blistering—long the most serious problem in house paint—results when moisture, migrating through walls from a building interior, is trapped by old-style paint films which cannot "breathe." The combination of the new blister-resistant primer and acrylic house paint is chemically engineered to allow moisture vapor to breathe through while shutting out water penetration from the outside.

Du Pont's present recommendations call for use of the new paint and primer only on new wood or on old surfaces from which the finish has been completely removed. However, the company's exposure panels and house tests indicate that the durability advantage exists when the new product is applied over firmly adhering old finishes that are in satisfactory condition for repainting. While no claims are being made in this regard until sufficient time has elapsed to provide more conclusive evidence than is now available, it is expected that the experience of another winter's weathering will provide such evidence.

Dr. Theobald explained that the acrylic emulsion material was developed during the broad investigation of acrylic resins leading to the introduction of "Lucite" acrylic lacquer as an auto finish in 1956. Today this lacquer adorns a substantial portion of 1959 model output.

"In addition to the 50 per cent increased durability, and blister resistance of the primer-emulsion system which is conservative," said the research director, "acrylic house paint has other remarkable qualities that will appeal to homeowner and painter. It dries to touch in 30 minutes. It's ready for a second coat in an hour. This means real savings in time and money, since a great deal of shifting of ladders, staging and materials is done away with. Also the period when bugs and dirt collection can mar a wet film is greatly reduced.

"Furthermore—and this is also important in terms of savings—acrylic house paint can be applied to a damp surface so that there is no need of prolonged delay because of dew or rain."

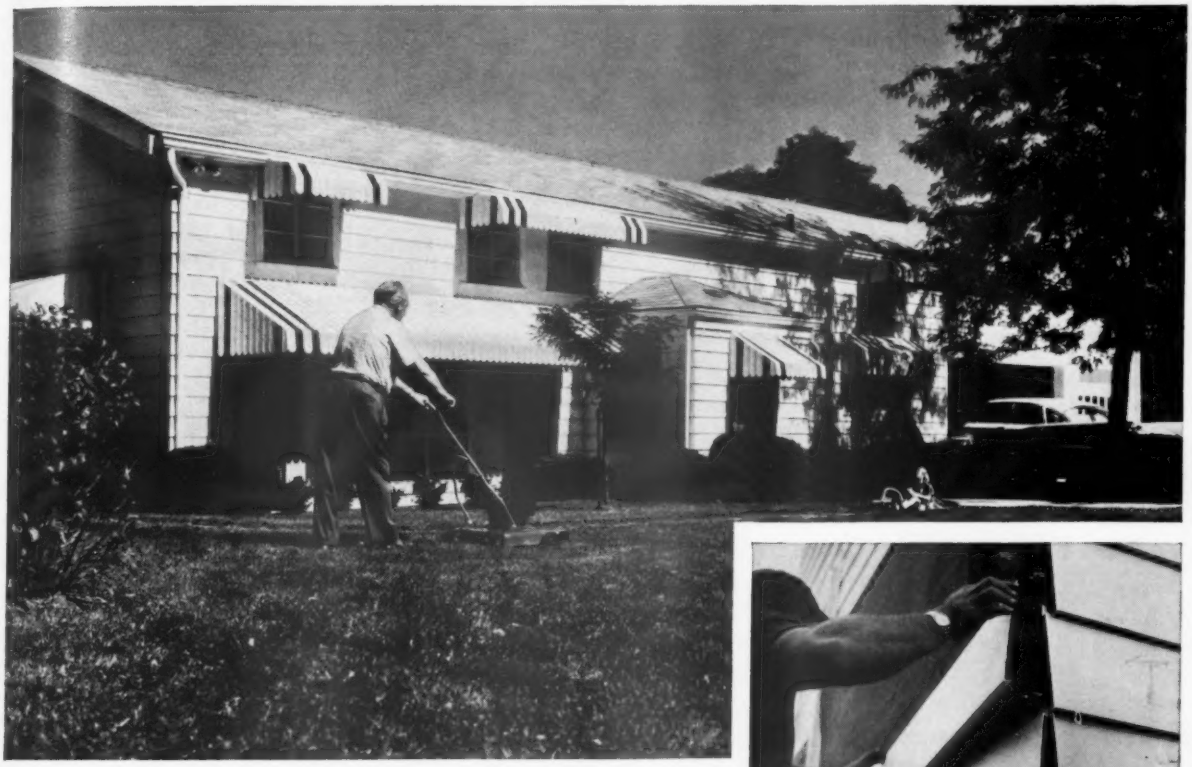
Still other favorable characteristics cited by Dr. Theobald are: very little chalking and hence almost no staining of adjacent masonry surfaces, good hiding in one coat, a satin gloss finish that minimizes dirt collection and tends to hide roughness and surface imperfections, good performance over yellow pine. Equipment and spatters can be easily cleaned with soapy water.

Acrylic house paint and the companion primer will be available soon in white and by spring in a range of colors.

"Blister House" in Du Pont Company paint laboratory where phenomenon of house paint failure through moisture blistering is studied. Exterior walls are kept cold while the interior is held warm and humid. This simulates chief cause of blistering which often takes place on frame houses during winter when interiors are heated and the atmosphere becomes laden with water vapor from such household activity as washing, showering and cooking. Under these conditions, moisture vapor migrates through wall from inside of house and becomes trapped behind standard oil-type house paints which do not "breathe," causing blisters. Panel section, lower right, shows the blister-resistant film adjacent to sections coated with oil paint and badly blistered under extremely severe conditions. Sap stain run-down is from ruptured blisters on panels bearing oil paint coats.

Another new development using

B.F.Goodrich Chemical *raw materials*



Aluminum awnings and aluminum siding made by Hastings Aluminum Products, Inc., Hastings, Michigan, in a wide range of colors using coatings manufactured by Sherwin-Williams, Inc., Cleveland, Ohio, made with Geon. B.F.Goodrich Chemical Company supplies the Geon polyvinyl materials only.

Homeowners get new high in quality, new low in upkeep with...

aluminum siding coated with Geon

Both the siding and awnings of this house are made of aluminum coated with Geon polyvinyl resin. They will not need painting for a long, long time because this Geon coating is really tough and durable. Both sides of the aluminum are coated before the siding and awnings are fabricated. Then the metal is formed, bent, punched and even applied to the house—all without affecting the appearance or performance of the finish.

Extensive laboratory and field tests have proved that this enamel-like coating made with Geon produces outstanding appearance, as well as weather- and weather-resistance far beyond what is available from conventional finishes. The manufacturer warrants this finish against blistering, cracking or crazing for 10 years. All that's needed to restore its excellent appearance is periodic washing.

Coatings made with Geon offer superior abrasion, electrical and chemical resistance—reasons why Geon is often the key to a new or improved product. For more information, write Dept. LK-1, B.F.Goodrich Chemical Company, 3135 Euclid Avenue, Cleveland 15, Ohio. Cable address: Goodchemco. In Canada: Kitchener, Ontario.

B.F.Goodrich Chemical Company
a division of The B.F.Goodrich Company

B.F.Goodrich

GEON polyvinyl materials • HYCAR American rubber and latex
GOOD-RITE chemicals and plasticizers • HARMON colors

PATENTS

Complete copies of any patents or trade-mark registration reported below may be obtained by sending 50c for each copy desired (to foreign countries $1.00 per copy) to the publisher.

Phthalocyanine Pigments

U. S. Patent 2,861,005. Alfred Siegel, Summitt, N. J., assignor to E. I. du Pont de Nemours & Co., Wilmington, Del., a corporation of Delaware.

A phthalocyanine pigment highly resistant to flocculation in an organic coating vehicle consisting essentially of a mixture of a major amount of a copper phthalocyanine pigment subject to said flocculation and a minor amount sufficient to impart flocculation resistance to said pigment of a substituted copper phthalocyanine in which the substituent is sulfonamide

$$(SO_2NX_2)$$

wherein X is a member of the group consisting of hydrogen, alkyl, and aryl radicals.

Vinyl-Acrylic-Silicone

U. S. Patent 2,860,074. Robert C. Hedlund, Midland, Mich., assignor to Dow Corning Corp., Midland, Mich., a corporation of Michigan.

A composition of matter consisting essentially of: (*a*) 10 to 55 percent by weight of a film-forming vinyl resin selected from the group consisting of homopolymers of vinyl alcohol and vinyl esters, copolymers of any of these vinyl compounds with each other, copolymers of any of the aforesaid vinyl compounds with vinylidene chloride and mixtures of said homopolymers and copolymers; (*b*) 40 to 85 percent by weight of an alkyl ester of an organic acid selected from the group consisting of methacrylic acid and acrylic acid wherein the alkyl groups contain less than 5 carbon atoms; and (*c*) 5 to 50 percent by weight of an alkyl-aryl polysiloxane having an average of from 1 to 1.8 organic radicals per silicon atom in the molecule, wherein not more than 90 percent of said organic radicals are alkyl groups.

Oil Modified Alkyd

U. S. Patent 2,859,188. Rudolph L. Heider, Springfield, Mass., and Harry M. Walker, Dickinson, Tex., assignors to Monsanto Chemical Co., St. Louis, Mo., a corporation of Delaware.

A coating composition comprising an organic solution of from 50 to 90% by weight of an oil-modified alkyd resin and from 10 to 50% by weight of an etherified hexahydrobenzoguanamine-aldehyde resin; said etherified hexahydrobenzoguanamine-aldehyde resin being prepared by (1) the alkaline condensation of from 3 to 6 molar proportions of a monoalkanal containing 1-4 carbon atoms with 1 molar proportion of hexahydrobenzoguanamine and (2) subsequently reacting the condensation product with from 3 to 10 molar proportions of a monoalkanol containing 1-6 carbon atoms under acid conditions.

Putty Stains

U. S. Patent 2,859,126. Roy E. Reno, Detroit, Mich.

A coating composition for protecting glass from putty stains consisting essentially of 16 to 32 parts by weight of liquid animal glue; 1 to 2 parts by weight of a material selected from the group consisting of methyl cellulose and polyethylene glycol; and 48 to 128 parts by weight of water.

Decorative Coating

U. S. Patent 2,866,720. William H. Martin, Grosse Pointe, and Edwin B. Morin, Allen Park, Mich., assignors to American-Marietta Co., a corporation of Illinois.

A method of making an ornamental protective crackle coating on the surface of an object comprising applying a uniformly pigmented thermosetting synthetic resin enamel base coating in a volatile organic solvent to said surface, permitting the solvent to evaporate from said base coating until the thermosetting resin is set in an immobile solvent-wet condition in which further application of organic solvent from an external source does not lift the pigment nor the resin therein and does not alter the gloss thereof nor spot the same, thereafter spraying onto said base coating in the form of liquid droplets a liquid translucent coating composition in which the vehicle consists of a volatile

organic solvent and which contains a light-stable, thermoplastic, low water-absorptive synthetic film-forming polymer as the film-forming agent dissolved therein to form translucent film island areas of substantially uniform thickness which adhere to said base coating, whereafter said coating and base coating are dried to firmly unite said coating to said base coating.

Corrosion Resistant Coating

U. S. Patent 2,860,118. Rudolf Nagel-Schmidt, Hanau (Main), and Anton Rudolph, Gross Zimmern, Germany, assignors to Deutsche Goldund Silber-Scheideanstalt vormals Roessler, Frankfurt am Main, Germany.

A corrosion preventing coating composition for metals comprising a chlorine containing organic polymer selected from the group consisting of chlorinated rubber, polychloroprene, chlorosulfonated polyethylene and copolymers of vinyl chloride and vinyl acetate as a film former, a copper compound selected from the group consisting of copper oxide and its hydrate and a tertiary organic heterocyclic base containing a six membered nitrogen containing heterocyclic ring selected from the group consisting of pyridine, picoline and quinoline.

Thixotropic Coating Compositions

U. S. Patent 2,861,048. Howard J. Wright, David R. McGuire, and Paul F. Westfall, Kansas City, Mo., assignors to Cook Paint & Varnish Co., Kansas City, Mo., a corporation of Delaware.

The process for making a thixotropic product which comprises dispersing a polyamide having a molecular weight not in excess of 1500 and comprising the heat reaction product of polymeric polyene fat acids, an alkylene polyamine having at least two primary amino groups, and from 20 to 60% by weight, of the total weight of all ingredients of a long chain monomer fatty acid having at least six carbon atoms, in a paint vehicle selected from the group consisting of alkyd resins, drying oils and resin acid esters at a temperature below the softening point of said polyamide.

Highway Marking Paint

U. S. Patent 2,865,266. James F. Wynn, Marietta, Ohio, assignor to American-Marietta Co., a corporation of Illinois.

U. S. Patent No. 2,865,266

A reflective highway marking paint comprising a paint vehicle containing a reflective pigment dispersed therein and from about 3 to about 8 pounds per gallon of glass-free paint of transparent glass fragments having a refractive index of at least approximately 1.5 incorporated in said paint, said glass fragments being sufficiently large to be retained by a U. S. Standard Number 270 mesh screen and being constituted by a plurality of angularly intersecting substantially planar, light reflecting faces.

Aqueous Dispersions

U. S. Patent 2,865,877. Harold L. Hatton and Joseph A. Stieber, Philadelphia, and Frederick W. Toothill, Jr., Abington, Pa., assignors to Rohm & Hass Co., Philadelphia, Pa., a corporation of Delaware.

An aqueous coating composition comprising (1) 33 to 90 parts of a salt of a copolymer of at least one acid of the group consisting of acrylic, methacrylic, and itaconic acids with at least one ester of an acid of said group with an alcohol having 1 to 18 carbon atoms, said copolymer containing from about 3% to about 20% by weight of salt units when calculated as the ammonium salt, (2) 5 to 45 parts of a salt of a copolymer in approximately 1:1 mole ratio of maleic anhydride and a branched chain unsaturated hydrocarbon of 4 to 10 carbon atoms selected from the group consisting of aliphatic olefines and unsaturated terpenes, the last-mentioned salt having a molecular weight of about 500 to 5000, each of the salts (1) and (2) being that obtained by the addition to an aqueous dispersion of the respective copolymer of a substance selected from the group consisting of ammonium hydroxide and volatile, water-soluble amines to neutralize acid-containing units in the copolymer, and (3) 5 to 25 parts of a water-insoluble ethylene oxide condensate of a higher alkyl phenol containing an average of from 1 to 5 oxyethylene units.

TECHNICAL Bulletins

PRODUCT INDEX

The new 1958/59 Product Index has been made available by the Chemical Division, Celanese Corp. of America, Dept. PVP, 180 Madison Ave., New York 16, N. Y.

Many products and their uses are listed under the major headings of: intermediates, solvents, plasticizers, gasoline additives, functional fluids, and cellulosics.

DISPLAY STANDS

"How To Select Display Stands" answers questions on how to give products more impact at the point of sale. The booklet is a completely revised edition and appears as one of the Little Packaging Library series published by Hinde & Dauch, Dept. PVP, Sandusky, Ohio.

The 36-page booklet shows manufacturers how display stands can introduce a new product, tie in with national advertising and sales themes, increase the unit of sale, tie in with seasonal product promotions and price or premium promotions.

Photographs of more than 30 modern corrugated display stands point out how effective displays can command customer attention and motivate the impulse to buy.

GLASSWARE

A comprehensive line of laboratory and scientific glassware is shown in the new 88-page Catalog 89A58 published by Fischer & Porter Co., Dept. PVP, 835 Jacksonville Rd., Hatboro, Pa.

A total of 377 glass items, including everything from adapters to stopcocks, are illustrated in the catalog. Prices are given.

STEEL DRUMS

Full specifications with drawings available on universal standard 55-gallon steel drums, open and closed head has been made available by Bennett Industries, Inc., Dept. PVP, Peotone, Ill.

Convenient file folder provided for this data and for future steel pail and drum specifications which will be sent to you.

STORAGE RACKS

A folder describing the new P-S 58 series of low cost storage racks has been prepared by Palmer-Shile Company, Dept. PVP, 12622 Mansfield, Detroit 27, Mich.

Photographs showing the many uses of the racks in the warehousing of almost any kind of materials stress the economy and versatility of the new design.

TERPOLYMERS

A 32-page technical manual on the properties and uses of Butvar, polyvinyl butyral, and Formvar, polyvinyl formal, has been published by Shawinigan Resins Corp., Dept. DD–PVP, Springfield 1, Mass.

Describing the acetal resins, Butvar and Formvar, as extremely versatile terpolymers, the booklet outlines, in detail, the physical properties of the various resin grades. In a separate section, insolubilizing reactions are described.

Also included in the booklet is a section devoted to a discussion of formulations and other data for suggested end-use applications. Wire enamel, wood and metal coatings, adhesives, textile coatings, molding and extrusion, strip coatings and printing ink additives are among the applications discussed.

NITROCELLULOSE SOLUTIONS

A four-page brochure which briefly describes some of its nitrocellulose solutions has been made available by Cellofilm Industries, Inc., Dept. PVP, Woodridge, N. J.

Included are typical formulations of solutions particularly suited for manufacturers of lacquer, ink, and floor finishes.

Also mentioned is a brief history of the development of solution manufacturing processes from the early days when the basic ingredient was scrap film.

MIXERS

Side and top entering mixers are described in a four-page bulletin published by the Specialty Engineers Co., Division of Phillips Associates, Dept. PVP, 6003 Market St., Oakland 8, Calif.

The bulletin illustrates the mixers and outlines advantages.

DUST COLLECTOR

New information sheets on two versatile cabinet cloth filter dust collectors have just been published by Torit Manufacturing Company, Dept. KP-PVP, Walnut and Exchange Streets, St. Paul, Minn.

The literature describes Torit models 64 and 66, compact, self-contained units in the 500 cfm range with a collection efficiency of better than 99.9%, even with particle sizes smaller than one micron. Photographs illustrate internal design and typical applications of the collector.

The information sheets also include multiple rating tables, complete specifications, and a dimensional drawing.

ACRYLIC SOLUTIONS

A 16-page booklet entitled, "Acryloid Acrylic Ester Resins for Coatings," has been made available by the Resinous Products Division, Rohm & Haas Company, Dept. PVP, Washington Square, Philadelphia 5, Pa.

The booklet presents tables of the properties, compatibilities, and uses of a number of these acrylic polymer solutions, as well as giving details on the formulation of adhesives, enamels, vinyl top coatings, luminous paints, and aircraft lacquers.

COLORANT DISPENSER

A brochure describing colorant dispensers has been made available by H. G. Fischer & Co., Dept. PVP, 9451-91 W. Belmont Ave., Franklin Park, Ill.

Special features of the dispensers are discussed and various characteristics are outlined and illustrated.

PHENOLIC PRODUCTS

A new, eight-page, illustrated brochure, describing the firm's line of phenolic resins, varnishes and molding powders, has been issued by the Chemical Materials Department, General Electric Company, Dept. PVP, One Plastics Avenue, Pittsfield, Mass.

Reproduced from the 1959 Sweet's Product Design File, the new catalog includes product features, special properties, and detailed technical data on G-E phenolic molding powders, phenolic laminating varnishes, phenolic foundry resins, "Methylon" coating resins, and industrial resins and varnishes.

The booklet (CDC-358) has been prepared as an aid to designers, molders, fabricators, formulators, and end-users, in the specification of phenolic materials.

HORIZONTAL MIXERS

A 12-page bulletin giving complete dimensions for mixers up to 500 cubic feet working capacity has been made available by The Young Machinery Co., Inc., Dept. PVP, Muncy, Pa.

Designated Bulletin F-1058-34, it illustrates various arrangements of ends, supports, agitators, shafts, glands, covers, inlets and discharges, gates and drives.

A complete mixer to your specifications can be assembled on vour drawing board.

A check-list is included to insure proper selection of the desired mixer components.

DIAL THERMOMETERS

New 12-page Catalog 205 on "Dial Thermometers" describes a completely redesigned line of indicating dial thermometers for temperature measurements in the range of −40°F. to +1000°F. offered by U. S. Gauge, Division of American Machine and Metals, Inc. Dept. PVP, Sellersville, Pa.

The company's comprehensive new line bears the tradename "Supertherm", being similar in both design and appearance with the company's premium-quality "Supergauge" line of pressure gauges.

Catalog gives specifications for both direct and remote reading types which are included in the company's new filled-system thermometer line. It also contains information on the four types of filling mediums as well as thermometer case sizes, materials, and styles.

Tables give useful selection data and dimensions for cases, bulbs, and bulb connections.

VINYL ALKYD PAINTS

The platy shape of wet ground mica increases the moisture resistance and improves the corrosion protective characteristics of vinyl alkyd paints according to a study reported in Technical Bulletin No. 37 of the Wet Ground Mica Association, Inc., Dept. PVP, 420 Lexington Avenue, New York 17, N. Y.: *Some Studies of the Water Vapour Permeability and the Corrosion Protective Characteristics of Vinyl Alkyd Paints.* The best results were produced by a paint containing equal amounts of platy 325-mesh wet ground mica and fibrous magnesium silicate.

This Bulletin continues the water vapor permeability series of Technical Bulletins No. 34, 35, and 36. Its results show a direct relationship with the results of the earlier corrosion resistance studies reported in Technical Bulletins No. 9 and No. 13.

CAN SORTERS & UNCASERS

An illustrated, eight-page brochure, describing automatic can sorters and uncasers, has been published by Atkron, Inc., Cuyahoga Falls, Ohio, and may be obtained from the Economic Machinery Co., Division of Geo. J. Meyer Manufacturing Co., Dept. PVP, 60 Fremont St., Worcester 3, Mass.

This brochure explains and illustrates the magnetic principle employed in Atkron Dumore can sorters and uncasers, and Atkron Dumore full-depth can uncasers and aligners. It includes sections detailing production and engineering features, typical installations, dimensional drawings, and tables of maximum capacity speeds with cans from six-ounce to five-quart sizes.

HEAT RESISTING PAINTS

A bulletin, entitled "Heat Resisting Paints," has been made available by Paint Sales Division, The Joseph Dixon Crucible Co., Dept. PVP, Jersey City 3, N. J.

The booklet describes heat resisting paints, outlines how they work, and discusses the three basic elements necessary for a satisfactory application.

A temperature chart of heat resisting coatings is included.

Facts concerning pigments and vehicles used in the firm's heat resisting coatings are presented.

PROPELLANTS

(*From page 34*)

Propellant	Weight	Temperature
Propellant 11	0.028 %	20°C.
Propellant 12	0.030 %	20°C.
Propellant 101	0.190 %	20°C.
Propellant 114	0.014 %	20°C.

Table II. Solubility (in water) of various propellants.

example, aerosol cosmetic products comply not only with regulations pertaining to pressurized packages, but also with all regulations of the Federal Food, Drug and Cosmetic Act.

Expressed another way, simple compliance with the laws and regulations pertaining to pressurized packages is not a carte blance stamp of approval for the manufacturer of an aerosol product. He must also comply with all other laws and regulations pertaining to his type of product, regardless of the form in which it is packaged.

Because nearly all products of modern business eventually enter the channels of interstate commerce, the federal regulations are of greatest importance to the aerosol industry. In most cases, compliance with all of the federal regulations is sufficient. However, manufacturers and marketers of aerosol products must keep abreast of local situations, in view of the tendency of state and local governments to set up their own specialized rules and regulations, in certain product areas.

Federal Agencies

On the federal level, the principal agencies whose regulations, pertaining to packaging and shipping, affect the aerosol industry are:

1. Interstate Commerce Commission
2. Department of Health, Education, and Welfare, Food and Drug Administration
3. Department of Agriculture
4. Post Office Department

	Propellant 11	Propellant 12	Propellant 11-12 Mix (50%-50%)
Formula	CCl_3F	CCl_2F_2	
Physical State at 70° F and 1 atm.	Liquid	Gas	Gas
Molecular Weight	137.38	120.92	128.63*
Melting Point °F	-167.8	-247.0	Below -168
Boiling Point at 1 atm. °F	74.8	-21.6	6.2*
Vapor Pressure, p.s.i.a. 70°F	13.4	84.8	51.4*
Density, Liquid g./cc at 70°F	1.485	1.323	1.399°
Gas Volume at 60°F & 1 atm. Pressure			
1) cc Vapor/gm Liquid	176	200	188
2) cc Vapor/cc Liquid	261	264	262
3) cu ft Vapor/Lb. Liquid	2.81*	3.20*	3.00*
4) cu ft Vapor/Fl. Oz. Liquid	0.272	0.276	0.274
Solubility			
Wt. % in water a 1 atm. Pressure g./100 g		0.026 at 27°C	
Wt. % water in at 1 atm. Pressure g./100 g	0.0127 at 30°C	0.011 at 30°C	
Flammability	No	No	No

*Calculated Values

Table III. Physical properties of Fluorocarbon propellants.

AEROSOL COATINGS

(*From page 25*)

(approximately minus 25°) before adding it to the container. The propellant is also cooled to about the same temperature and added as a liquid to the product base. The unit is then sealed with a suitable valve and heat tested at 130° F in a water bath. The heat test is standard procedure for almost all types of aerosols produced, regardless of the filling procedure employed.

Obviously in the cold filling method, an already relatively viscous product would become considerably more viscous at the extremely low temperatures to which it is subjected. Thus, special mixing and filling equipment is required to maintain a steady flow through the production line, as well as uniform dispersion of the various ingredients, particularly any pigments that may be used.

Products containing pigments or a relatively large proportion of solids require the addition of a glass or steel agitator ball in the container.

Shelf Testing

The importance of this step cannot be over emphasized.

Before a complete product can be considered ready even for test marketing, it should be thoroughly tested under varying conditions of storage and use. Experimental units of the *complete formulation* should be kept stored at room and at elevated temperatures in different positions for at least two to three months. Pigmented paints and coatings having relatively high solid content preferably should be stored for six months or longer. Particular attention should be given to evidence of possible corrosion to container, affect of product on gasket and other valve components, impaction of solids and ease of uniform re-dispersion of pigment.

Formulations

The following suggested formulations are representative of the various types of coating compositions discussed above.

Preparation of these compounds, while relatively simple, nevertheless require particular attention as to quality of ingredients, fineness and *uniformity* of pigment or other dispersed ingredient, and careful viscosity control of the product base.

Viscosity measurements of the base are usually made with a Number 4 Ford Cup. However, it is practical to measure the viscosity of a complete formulation under pressure by means of specially adapted Ultra-viscoson apparatus.[1] Surface coatings generally are in the range of 15 to 20 seconds, but the optimum viscosity for any particular product must be determined individually in relation to the type of valve used.

1. Leighton, W. B., Proc. 44 Mid-Year Meeting, CSMA, May 1958.

Aerosol Clear Lacquer
(Acrylic Resin Type)

	Parts by wt.
*Acrylod B72 (100%)	10.0
Butyl acetate	5.0
Toluol	35.0
Propellant 12/11 (50:50)	50.0

*Available as 40% solids in toluol.

Aerosol Decorative Spray
(Water Miscible Type)

	Parts by wt.
*PVP/VA (I-335)	10.0
Isopropanol (Anhydrous)	14.5
Dye (Alcohol soluble)	0.5
Propellant 12	22.5
Propellant 11	52.5

*General Chemical Division, Allied Chemical & Dye

Aerosol Clear Lacquer
(Nitrocellulose-Alkyd Type)

	Parts by weight
*Nitrocellulose RS ¼ sec. (100%)	4.0
*Beckasol 23 (100%)	4.0
Dibutyl pthalate	5.0
Methyl isobutyl ketone	35.0
Butyl cellosolve	2.0
Propellant 12	50.0

*Use in a solution of methyl isobutyl ketone.

Aerosol Pigmented Paints
(Acrylic Resin Type)

	Parts by weight
Acrylic resin (Duraplex D65A)	10.0
Toluene	10.0
Xylene	10.0
Methylene chloride	15.0
*Pigment	5.0
Propellant 11	10.0
Propellant 12	40.0

*The concentration of pigment will depend on the type used and the degree of opacity desired.

(Nitrocellulose Resin Type)

*Nitrocellulose RS ¼ sec (100%)	2.5
*Beckasol 23	2.5
Methyl isobutyl ketone	30.0
Butyl cellosolve	3.0
Dibutyl pthalate	3.0
Pigment	9.0
Propellant 12	50.0

*Use in a solution of methyl isobutyl ketone.

(Non-Flammable Pigmented Type)

	PARTS
Methylene Chloride	23.00
Darasol (40% Solids)	11.50
Pigment-Revere Red Imperial	.50
Propellant 11	22.00
Propellant 12	43.00

Du Pont offers new source of supply for Cellulose Acetate

DU PONT CELLULOSE ACETATE now available to manufacturers of lacquer removers in wide range of acetylation and viscosity.

For tough, weather-resistant lacquers, Du Pont Cellulose Acetate has excellent light stability characteristics, low flammability and good solubility.

For fast-acting paint removers, Du Pont Cellulose Acetate is available in a wide range of viscosities to help you give your product any desired pouring or brushing characteristics. And its ready solubility allows you to use very strong paint-removing solvents.

PURCHASING DATA

Types: Your choice of an unusually wide range

Acetylation range: From 52% to 56%

Viscosity range: From 3 to 150 sec., Du Pont 20% viscosity

Package: Easy-to-handle multiwall bags

For full details or information on price and shipping arrangements, call or write to any of the district offices listed below:

BRANCH OFFICES

BOSTON: 140 Federal Street, Room 325, Boston 10, Mass., Phone HAncock 6-1711; **CHARLOTTE:** 427 West Fourth Street, Charlotte 1, N. C., Phone FRanklin 5-5561; **CHICAGO:** 7250 North Cicero Avenue, Lincolnwood, Chicago 46, Ill., Phones INdependence 3-7250, ORchard 5-1010; **CLEVELAND:** 11900 Shaker Blvd., Cleveland 20, Ohio, Phone LOngacre 1-5070; **HOUSTON:** 3202 Weslayan Street, O'Meara Bldg., Houston, Texas; **LOS ANGELES:** 2930 East 44th Street, Los Angeles 58, Calif., Phone LUdlow 2-6464; **NEW YORK:** 350 Fifth Avenue, 1000 Empire State Bldg., New York 1, N. Y., Phone LOngacre 3-6400

DU PONT
CELLULOSE ACETATE

DU PONT
REG. U.S. PAT. OFF.

Better Things for Better Living . . . *through Chemistry*

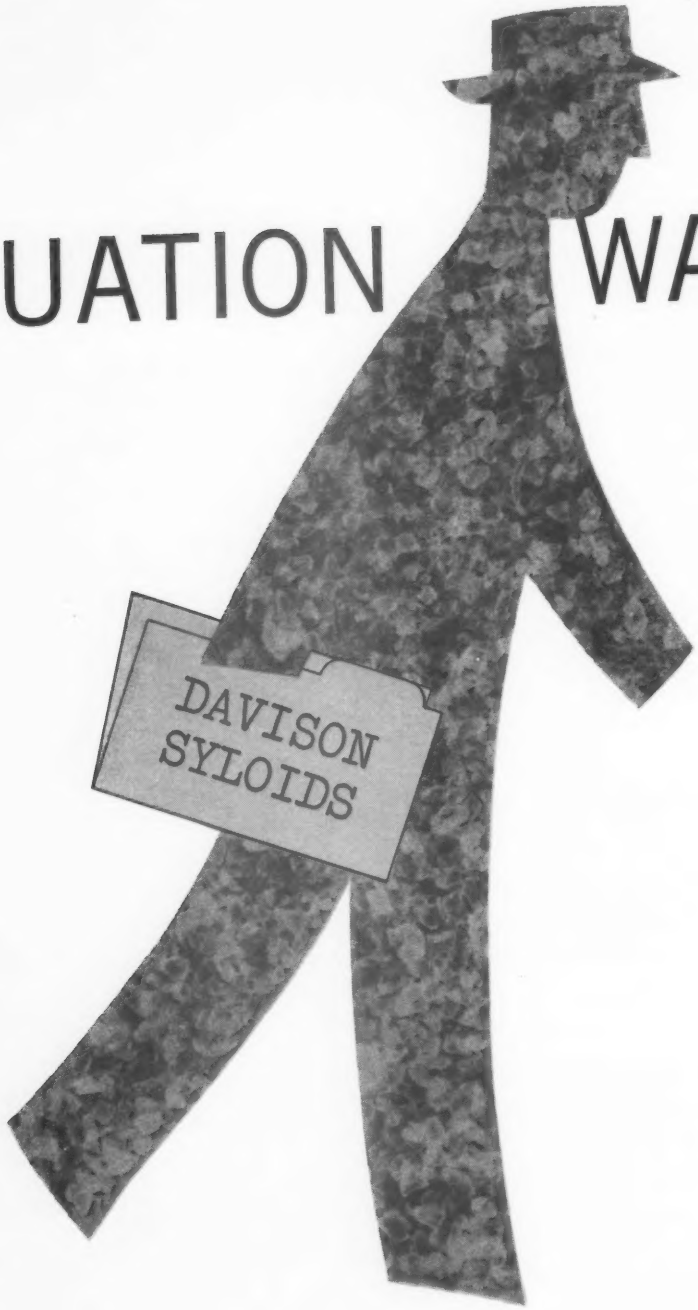
foreign developments

British Research on Epoxidized Oils, Part III

Soviet and Polish Abstracts

Improved corrosion resistance can be obtained by adding epoxidized oil to polyvinyl acetate-chloride, petroleum resins, chlorinated rubber, and melamine and urea resins. For a discussion of this development, see page 85.

SITUATION WANTED



Davison Syloids are Wonder-workers! Finely divided silica gels, Syloids are readily adaptable to widely varied applications. For example, Davison Syloid 308 gives fine furniture the luxurious patina of handrubbing without a single rub of a hand. Syloid AL-1 quiets gas pressure in the can—greatly extending shelf life of metallic paints. Other Syloid compounds impart specific qualities such as flatting, gas removal, anti-blocking, increased adhesion, insulation, thickening and drying to many products. If you can benefit from a better product—through eliminating or reducing time and money-consuming operations—write Department 3012 or call today for complete information.

W.R. GRACE & CO.
DAVISON CHEMICAL DIVISION
BALTIMORE 3, MARYLAND

A New Development from England—

Surface Coatings from Epoxidized Oils

Part III
(*conclusion*)

It is reported that protective coatings containing epoxidized soybean oil are now actually being used in England. Work is also known to be under way in several laboratories in this country, although, as yet, it is believed that no commercial vehicles containing epoxidized soybean oil have been introduced. The field is indeed an inviting and challenging one, and it will be of interest to follow its progress in the coming years. Whatever this progress will be, one may be assured that it is a direct function of the paint chemist's ingenuity.

Epoxidized oils, their preparation, properties and uses are discussed in this final installment.

EPOXIDIZED soybean oil may be used in protective coatings in a variety of ways (2,63). Of particular interest is the work that has been reported on the incorporation of this compound in alkyd resins.

As has already been indicated, an epoxy group reacts with a carboxyl group to provide an ester linkage and to generate a hydroxyl group. This reaction takes place rapidly at room temperature with low molecular weight organic acids. With the higher molecular weight acids typical of the protective coatings industry, the opening of the ring does not take place rapidly until a temperature of about 150°C. has been achieved. It goes without saying that the newly generated hydroxyl group may also be esterified in standard fashion with a carboxyl group at the usual temperatures of 175°-250°C. Since a typical epoxidized soybean oil contains approximately 3-½ epoxy groups per molecule one can see that it should be a highly functional material in the normal alkyd condensation reactions.

Actually the full functionality is not realized (63) when the epoxide groups are reacted with fatty acids because of side reactions which lead to the formation of polymeric ethers. One may consider that the epoxidized oil molecule will react to the extent of 65 to 75 per cent of its full functionality; and in an alkyd condensation this reaction can take place either with the fatty acids present or with the dibasic acids such as phthalic or maleic anhydrides.

Use in Alkyds

An epoxide may be used in alkyds in several ways. Chatfield (60) utilized epoxidized soybean oil to obtain alkyds of low acidity. It is, of course, desirable in most alkyd resins to have as low an acid number as possible. On the other hand, long cooking to reduce acid number is frequently associated with over-polymerization. In his experiments, Chatfield processed a 65 per cent oil length linseed glycerol alkyd at 230°C. using a ten per cent excess of glycerol. After six hours of processing, he added ten per cent of epoxidized soybean oil based on the weight of the alkyd. In two hours, the acid number was reduced from 17.3 to 6.2 or approximately eleven units. The control alkyd, on the other hand, decreased in acid number over the same period only 5.6 units (from 14.7 to 9.1). The author points out, of course, that considerably more work is needed to assess the full value of these experiments, although they do indeed indicate that the epoxidized oil can be used to reduce acid number without increasing degree of polymerization.

The use of epoxidized oils to lower the acidity of stand oils has also been reported (63). Recommended procedures involve heating the stand oil at 200-250°C.

with five to ten per cent of the epoxidized oil. Because the reaction between the epoxy group and the carboxyl group is more rapid than the normal esterification reaction, this procedure makes possible the achievement of low acid numbers quite readily. Actually the acidity provided by materials like rosin, Congo, Copal and related resins can be reduced by reaction with epoxidized oils. It is claimed that varnishes from Copal resins combined with epoxidized soybean oils have improved resistance to moisture and better gloss retention.

In another series of experiments, Chatfield (61) used epoxidized soybean oil as a partial replacement for glycerol in a long oil linseed acid, phthalic anhydride, glycerol alkyd. This is possible since the epoxy group reacts with the phthalic anhydride and the linseed acids, as the above discussion on the chemistry of these compounds has indicated. The net result of replacing some of the glycerol with epoxidized soybean oil was to obtain coatings which air-dried fast, which were tougher, and which demonstrated better adhesion. Also, processing time was decreased, since the reaction between an epoxide group and a carboxyl group is a more rapid reaction than the corresponding reaction between hydroxyl and carboxyl groups. The decrease in processing time was also observed with very long oil length alkyds, even though lower temperatures were used with the epoxidized soybean oil present than with the glycerol alone.

Another "plus feature" was the improvement in color of the products. This might be expected because of the lower temperatures involved and the shorter processing times.

In the bulk of the work, the ingredients were heated together simultaneously. Thus, in the preparation of the very long oil, air-drying alkyds, the following two comparative formulations were made:

	Alkyd Without Epoxidized Oil	Alkyd With Epoxidized Oil
Linseed oil fatty acids	367	367
Phthalic anhydride	74	74
Glycerol	78.5	62.8
Epoxidized oil	——	145
Approximate oil length	80%	84.5%

It will be observed that the oil length was longer in the second alkyd, since the epoxidized oil, of course, contributes to oil length. These alkyds were cooked for 28 hours over a temperature range of 230 to 260°C. The one containing epoxidized oil had a somewhat higher acid number (7.1 versus 5.0) but was lighter in color. The viscosity at 25°C. was sixteen poises for the epoxidized oil-containing alkyd as opposed to 9.5 poises for the control. This observation, which is interesting when one considers the longer oil length of the experimental alkyd, can be attributed to the higher degree of functionality contributed by the epoxidized soybean oil. It is also interesting to note that the final viscosity of the control, which was achieved after 23 hours of processing, was the same as the viscosity demonstrated by the epoxy-containing alkyd after five hours of processing. These effects are, of course, emphasized by replacing more of the glycerol with epoxidized oil.

These results are reiterated in the bulletin of an epoxidized oil supplier (63) who points out that the preparation of long oil alkyds is frequently accompanied by the need for long processing time in order to achieve a satisfactory degree of polymerization. The addition of epoxidized soybean oil to the cook, however, may reduce this cooking time by as much as 33-1/3 per cent, while at the same time providing higher viscosities than can normally be achieved. They recommend that up to 20 per cent of the polyhydric alcohol normally used be replaced by the epoxidized soybean oil. The calculations should be made on the basis of hydroxyl equivalence, assuming that the epoxidized oil molecule has approximately 2.5 equivalent hydroxyl groups.

It must also be realized that the epoxidized oil contributes oil length to the final composition. This additional oil length does not decrease viscosity, however, because of the functionality which is being contributed at the same time by the epoxy groups. If, however, one wishes to maintain a constant oil length he must cut down on the amount of modifying oil normally used.

Similar results were observed (61) in experiments aimed at producing alkyds of oil lengths around 60 per cent. In all cases, it was observed that although oil length increased on the addition of the epoxidized soybean oil, the viscosity also increased, as did the bodying rate.

The so-called monoglyceride technique may also be used with epoxidized soybean oil. Thus, in one experiment, (61) linseed oil was alcoholized with glycerol in the presence of caustic soda until a clear solution was formed with methanol. Thereafter, phthalic anhydride, linseed acids and epoxidized oil were added and the processing was completed. In the control, only phthalic anhydride and more linseed oil were added. In one example, the control had a viscosity of six poises after six hours of processing as opposed to a viscosity of 57 poises for the epoxidized soybean oil-containing alkyd. After 10-½ hours of processing the relationship was 32 poises to 200 poises.

Still another way of incorporating epoxidized soybean oil into an alkyd is to replace part of the glycerol used to prepare monoglyceride with an equivalent weight of epoxidized oil, assuming that each epoxide group will react with one fatty acid molecule. One immediate advantage was that a monoglyceride more soluble in alcohol resulted when the epoxidized oil was included. When considerably larger quantities of epoxidized soybean oil are used, the resulting alkyds are said to contain free epoxy groups (2). Coatings prepared from such alkyds are believed to have increased anticorrosion properties and improved adhesion, as might be expected from the presence of free polar linkages. Reference to the reactions described earlier in this article will demonstrate how these epoxy groups may be used to incorporate phosphorous or chlorine into the molecule for such properties as flame retardance.

Chatfield (61) has also described the preparation of unmodified alkyds by directly interacting epoxidized soybean oil with phthalic anhydride. As might be

expected, tough gels form even when that ratio of phthalic anhydride to epoxidized oil is of the order of ten parts to 90 parts. Chatfield proposes that these gels, combined with suitable fillers, can provide the bases for cements and thermosetting compounds for a variety of uses. These alkyds may be modified with rosin or with rosin derivatives in order to reduce the tendency to gel.

Chatfield has also used epoxidized soybean oil in non-drying, plasticizing alkyd formulations based on lauric acid. The observations from this work were that the non-drying alkyds had improved compatibility with urea and melamine-formaldehyde resins and provided better flexibility, shock resistance, and water resistance.

Use in Epoxy Resins

In the field of epoxy resins, it has been shown (2) that epoxy ester coatings can be modified with epoxidized soybean oil. This has the advantage, of course, or reducing cost. At the same time, the addition is said to improve gloss, resistance to corrosion, and gas checking.

For long oil esters it is recommended that 25 per cent of the epoxy resin be replaced by epoxidized soybean oil (63). For short oil esters up to one-third of the epoxy resin may be replaced by epoxidized soybean oil.

Mixtures of epoxy resin and epoxidized soybean oil may be used for casting and adhesive compositions as well as for coatings. Thus one recommendation (63) suggests that 10 to 40 per cent of the epoxy resin be replaced by epoxidized soybean oil. The resulting mixture may then be cured with polyamines or with catalysts such as phosphoric acid or borine trifluoride complexes to obtain compositions of value in structural applications. For electrical potting it is recommended that the blend of epoxidized soybean oil and epoxy resin be cured with phthalic anhydride.

Corrosion Resistance

Reference has been made several times to the fact that the free epoxy groups tend to contribute corrosion inhibiting properties. Chatfield (62) has studied epoxidized soybean oil as an additive to surface coatings for this purpose. Thus, he observed improved corrosion resistance when the epoxidized oil was added to resins, such as polyvinyl acetate-chloride copolymer, resins of petroleum origin, chlorinated rubber, and melamine and urea resins. In formulations containing rust inhibiting pigments such as zinc chromate and red lead, it was possible to substitute iron oxide for some of the pigment without losing corrosion resistance if epoxidized soybean oil was present. Also, iron oxide primers, either baked or air-dried, demonstrated marked improvement in corrosion resistance if epoxidized soybean oil was included in the formulation. This applied also to coatings pigmented with metallic aluminum or zinc. When the epoxidized soybean oil was reacted with linseed fatty acids, a composition was obtained which improved the corrosion resistance of compositions in which this combination was used instead of normal drying oils.

The mechanism by means of which epoxidized soybean oil confers corrosion resistance to protective coatings is somewhat obscure. One may conjecture, however, that the free epoxide groups may react with acid which is present or which is liberated in the course of weathering. Because of the polarity of the epoxy groups the coating may be expected to have improved adhesion which in itself could contribute to better corrosion resistance.

If the corrosion resistance is dependent on the presence of epoxy groups it would follow that it is best to add the epoxidized soybean oil as such without employing a reaction which would tend to destroy the epoxy groups. This is actually the recommendation of one of the suppliers (63). The optimum quantity of epoxidized soybean oil depends on many factors including the type of coating, the conditions of weathering, and the degree of protection required. In general, the additions should not be greater than ten per cent, and it is best to add the epoxidized oil after the completion of the manufacture of the protective coating, preferably while it is still warm.

The use of epoxidized soybean oil in a variety of anti-corrosive protective coatings formulations has been explored (63). Thus, it has been found that the use of five to ten per cent of epoxidized oil in red lead primers makes possible the reduction of the red lead content by as much as 60 per cent. Added advantages are said to be easier redispersion of the pigment and better brushing characteristics of the coating. A recommended red lead formulation consists of a vehicle obtained by reacting epoxidized oil with an equal weight of linseed acids and then adding to this five per cent of epoxidized oil.

The addition of ten per cent of epoxidized oil to calcium plumbate primers makes it possible to replace some of the calcium plumbate by cheaper red iron oxide. Again the epoxidized oil contributes to easier redispersion of the pigment. The same comments apply to lead cyanamide primers. An added advantage here is that the epoxidized oil makes the coating more resistant to bleaching and chalking.

Five to ten per cent of the epoxidized soybean oil may be added to red iron oxide primers in order to improve the anti-corrosive properties of this primer. This situation is different from that reported for the calcium plumbate and lead cyanamide primers where the addition of the epoxidized oil *per se* did not improve the primers as they already possess excellent anti-corrosive properties. The advantage in the case of the plumbate and the cyanamide primers was that the more expensive pigments could be replaced by substantial portions of cheaper red iron oxide without harming the anticorrosive properties.

A similar situation exists with iron oxide-zinc chromate primers where the addition of five per cent of the epoxidized soybean oil made possible the replacement of up to 75 per cent of the zinc chromate by the cheaper iron oxide without harming the anti-corrosive properties of the film.

Epoxidized soybean oil exhibits an anticorrosive effect when the paint is applied to a ferrous surface. It does not seem to provide benefit when paints are applied to aluminum. On the other hand, the addition of five per cent of epoxidized oil to aluminum paints

helps to prevent loss of brilliance of the aluminum powder and retards gassing on storage.

Other Uses

Still another approach to the use of the epoxidized oils in protective coatings is to regard the epoxidized oil simply as a polyhydric alcohol. From this point of view one may react it with drying or semi-drying oil fatty acids to obtain synthetic drying oils. It has been reported (63) that these oils have properties which are superior to conventional oils. Thus, if one reacts equal parts of an epoxidized soybean oil with linseed oil fatty acids there results a reconstituted oil which is claimed to dry more rapidly than linseed oil. The resulting films are said to have greater toughness, less residual tack, greater surface hardness, improved water resistance and less tendency to discolor. So far as speed of drying is concerned the composition is said to dry at a rate almost comparable to that of dehydrated castor oil and the film resembles a varnish film more than an oil film.

When soybean oil fatty acids are used in place of the linseed acids a composition is said to result (63) which appears to be equivalent to linseed stand oil.

Another recommended formulation consists of a reaction product of 82 parts by weight of rosin, 133 parts of linseed oil fatty acids and 200 parts of epoxidized soybean oil. This product dries faster than a bodied linseed oil and yields tough hard films with very little residual tack. The reaction product of the epoxidized soybean oil and dehydrated castor oil acids is said to be particularly valuable because of its resistance to webbing and frosting.

As might be expected, epoxidized soybean oil may be used in the formulation of unsaturated polyester resins as well as in the manufacture of alkyds (63). Here the epoxidized oil is considered as a partial replacement for the glycol normally used in such polyesters. As is normally the case, the resulting unsaturated polyester may then be crosslinked with styrene in the presence of peroxide catalyst and an accelerator such as a cobalt salt. Preliminary indications are that the use of epoxidized soybean oil in such polyesters leads to products with greater resilience and improved adhesion to metal substrates. This latter property is extremely important since crosslinked polyesters normally demonstrate poor adhesion.

Bibliography

1. Terry, D., Wheeler, D. H., U.S. Patents 2,458,484 (1949); 2,559,177 (1951).
2. Solvay Process Div., Allied Chem. Corp., Tech. Service Bull., "Recent Advances in Uses for Epoxidized Fatty Acid Derivatives", July 18, 1958.
3. Prileschajew, Nikolaus, *Ber. der Deut. Chem. Ges.*, **42**, 4811 (1909).
4. Arbuzov, B. A. and Miklhailov, B. M., *J. prakt. Chem.*, **127**, 1 (1930).
5. Niederhauser, Warren D. and Koroly, Joseph E., U. S. Patent 2,485,160 (1949).
6. Findly, T. W., Swern, D., and Scanlon, J. T., *J. Am. Chem. Soc.*, **67**, 412 (1945).

6A. Swern, D., *Chem. Rev.*, **45**, 1 (1949).

7. Greenspan, F., *Ind. Eng. Chem.*, **39**, 847 (1947).
8. Gall, R. J., and Greenspan, F., *Ind. Eng. Chem.*, **47**, 147 (1955).
9. E. I. du Pont de Nemours and Co., Peroxygen Products Bulletin, P61-454.
10. Union Carbide Chemicals Co., "Peracetic Acid and Derivatives", Tech Service Bulletin, 2nd Ed., (1958).
11. E. I. du Pont de Nemours and Co., "Epoxidation and Hydrogenation", Tech. Service Bulletin (1953).
12. Winstein, S. and Henderson, R. B., *J. Am. Chem. Soc.*, **65**, 2196 (1943).
13. Mousseron, M., Jacquier, R. and Fontaine, A., *Bull, soc. chim. France*, (5), **19**, 767 (1952).
14. Fraenkel-Conrat, H. and Olcott, H. S., *J. Am. Chem. Soc.*, **66**, 1420 (1944).
15. Brunel, *Ann. chim. et phys.*, (8) **6**, 249 (1905).
16. Kotz, A. and Merkel, P., *J. prakt. chem.*, (2) **113**, 49 (1926).
17. Schmidt, *Ann.*, **337**, 116 (1904).
18. Brunel, *Compt. rend.*, **137**, 198 (1903).
19. Funke, A. and Benoit, G., *Bull. Soc. chim. France*, 1021 (1953).
20. Paterno, E. and Cingolani, E., *Gazz chim. ital.*, **38**, 243 (1908).
21. Rothrock, H. S., U. S. Patent 2,054,099 (1936).
22. Rice, E. O. and Stallbaumer, A. L., *J. Am. Chem. Soc.*, **64**, 1527 (1942).
23. Patnode, W. I. and Sauer, R. O., U. S. Patent 2,381,137 (1945).
24. Malinovski, M. S. and Medyantseva, N. M., *Zhur. Obshchei Khim.*, **23**, 221 (1953).
25. Pechukas, A., U. S. Patent 2,576,138 (1951).
26. Malinovskii, M. S., *Zhur. Obshchei Khim.*, **17**, 1559 (1947).
27. Malinovskii, M. S. and Medyantseva, N. M., *Zhur Obshchei Khim.*, **23**, 84 (1953).
28. Stone, F. G. A., and Emeleus, H. J., *J. Chem. Soc.*, 2755 (1950).
29. Wurtz, *Ann. Chim.*, (3), **69**, 317 (1863).
30. Barusch, M. R., and Payne, J. Q., *J. Am. Chem. Soc.*, **75**, 1987 (1953).
31. Dermer, O. C., and Durr, A. M., Jr., *J. Am. Chem. Soc.*, **76**, 912 (1954).
32. Raphael, R. A., and Roxburgh, C. M., *J. Chem. Soc.*, 3875 (1952).
33. Bedos, P., *Compt. rend.*, **183**, 750 (1926).
34. Bogert, M. T., and Roblin, R. O., Jr., *J. Am. Chem. Soc.*, **55**, 3741 (1933).
35. Carnes, J. J., U. S. Patent 2,520,381 (1950).
36. Boberg, F., and Schultze, G. R., *Chem. Ber.*, **88**, 275 (1955).
37. Colonge, J., and Rochas, J., *Compt. Rend.*, **233**, 403 (1946).
38. Hormann, J. V., *Ber.*, **12**, 23 (1879).
39. Culvenor, C. C. J., Davies, W. and Heath, N. S., *J. Chem. Soc.*, 278 (1949).
40. Adams, C. E., U. S. Patent 2,372,244 (1945).
41. Knunyants, I. L., and Sterlin, R. N., *Compt. Rend. Acad. Sci. U. S. S. R.*, **56**, 40 (1947).
42. Tachimori, M., and Matsushima, T., *J. Soc. Chem. Ind. Japan*, **46**, 1270 (1943).
43. Furukawa, K., and Oda, R., *J. Chem. Soc. Japan*, **58**, 267 (1955),.
44. Boeseken, J., and Van Giffen, J., *Rec. Trav. Chim.*, **39**, 183 (1920).
45. Cline, W. K., U. S. Patent 2,667,497 (1954).
46. Culvenor, C. C. J., Davies, W., and Pausacker, K. H., *J. Chem. Soc.*, 1050 (1946).
47. Favorsky, *J. Russ. Phy. Chem. Soc.*, **38**, 741 (1906).
48. Willgang, G., *Ber.*, **74B**, 145 (1941).
49. Culvenor, C. C. J., Davies, W., and Pausacker, K. H., *J. Chem. Soc.*, 1050 (1946).
50. Malinovskii, M. S., *Zhur. Obshchei Khim.*, **10**, 1918 (1940).
51. Cook, J. W., Hewett, C. L., and Lawrence, C. A., *J. Chem. Soc.*, 71 (1936).
52. Malinovskii, M. S., and Romantsevich, M. K., *Sbornik Statei Obshchei Khim.*, **2**, 1366 (1953).
53. Haller, and Blanc, *Compt. Rend.*, **137**, 1203 (1903).
54. Mousseron, M., and Canet, M., *Bull. Soc. Chim. France* (5), **19** 190 (1952).
55. Bedos, P., *Compt. Rend.*, **183**, 562 (1926).
56. Bradley, W., Forrest, J., and Stephenson, O., *J. Chem. Soc.*, 1589 (1951).
57. Gabriel, S., and Ohle, H., *Ber.*, **50**, 819 (1917).
58. Suter, C. M., and Milne, H. B., *J. Am. Chem. Soc.*, **65**, 582 (1943).
59. Gulvenor, C. C. J., Davies, W., and Heath, N. S., *J. Chem. Soc.*, 278 (1949).
60. Chatfield, H. W., *Paint Manuf.*, **27**, 51.56 (1957).
61. Chatfield, H. W., *J. Oil. and Colour Chemists' Assoc.*, **41**, 301 (1958).
62. Chatfield, H. W., *Paint, Oil and Colour J.*, **133**, 398,446,522 (1958).
63. A. Boaks, Roberts & Co. Ltd., *Tech. Bulletin* **1006***d*, "Abrac 'A' In the Manufacture of Resins and Surface Coatings".

SOVIET and POLISH ABSTRACTS

The extent of Soviet basic research in high polymers is demonstrated by a recently published work on the synthesis of high molecular substances through many radical recombinations.

This method is different than polymerization since saturated compounds are used as starting materials and the resulting polymer is formed by polyrecombination process involving the reaction of free radicals with the hydrogen of the polymer methyl group.

Polymer Production by Polyrecombination Reaction

By V. V. Korshak, S. L. Sosin, & M. V. Khistiakova, "Doklady Akademii Nauk SSSR," Vol. 121, 2:299-302, July 1958.

It is suggested that polyrecombination reaction may be used as a method of synthesizing high-molecular substances from a large variety of starting compounds. The reaction causes the separation of high-molecular compounds, rather than dimers, from the solvent; the materials studied were prepared on the basis of n-diisopropylbenzene and various peroxides (especially of tertiary butyl). The hydrocarbon was heated to 170-200°C; tertiary butyl peroxide was added slowly. Depending on the reaction conditions, the formed polymer contains smaller or larger amounts of insoluble three dimensional parts. The soluble portion is extracted by benzene and settled out be methanol; the obtained polymer is a white powder melting at 210-230°C and practically amorphous. The insoluble polymer decomposes at about 300°C. The relation of the quantity of tertiary butyl peroxide to the yield and molecular weight of product were studied. The mechanism of the reaction is suggested: peroxide splits to produce free radicals (about 50 percent cent of the peroxide in experiment was found to form butoxylic radical) which act on n-diisopropylbenzene by removing its hydrogen atom in the isopropyl group; the thus formed diisopropyl radical reacts with analogous radical, forming a dimer, which in turn undergoes the action of free radicals. The authors propose to name the reaction, in which polymer is formed as the result of many radical recombinations, "polyrecombination" (polyrekombinatsiia); it differs from polymerization in that the initial substances are saturated compounds, and what it proceeds by radical mechanism, having gradual character. The formation of insoluble trimers results from the reaction of free radicals with H atoms of the polymer methyl groups; the insoluble product was not obtained when benzoyl peroxide was used in larger quantities (its less reactive radicals apparently do not disturb the hydrogen atoms of methyl groups). Benzoic acid may therefore be used as modifier which also causes the formation of linear polymer only.

New Materials For Furniture Finishing

By B. M. Bulgai, A. L. Pripiatinskii, I. I. Shubina, & L. L. Korshun, "Derevoobrabatyvaiushchaia Promyshlennost'," Vol. 7, 9:1-5, September 1958.

The Moscow Wood-Technological Institute and the Leningrad Scientific-Research Institute of Wood Chemistry have prepared a number of new finishing products: priming and pore-filling compositions, and polishes for nitro-lacquer coatings. A variety of these new materials are described, together with methods of preparation, characteristics etc. The products are said to have demonstrated superior qualities.

Mechanical Properties of Casein Films

By V. I. Eliseeva & E. V. Kuzmina, "Zhurnal Prikladnoi Khimii," Vol. 31, 8:1245-1251, August 1958.

The following observations were made in the frame of attempts to prepare water-stable and elastic casein films by the introduction of detergents into the casein solution. Addition of detergents (and alizarin oil) to casein solution does not change considerably the degree of assymetry of its molecules (calculated by Kuhn method), nor does it alter significantly the mechanical properties of casein oil. Plasticizer (non-solvent) such as glycerine does not increase elasticity of casein films unless the moisture content of the film is raised. At constant moisture content, glycerine acts as a non-gelating plasticizer. Elasticity increases when detergent is introduced into moist, glycerine-containing casein films. The migration of glycerine during storage of such films leads to their brittleness.

Casein films become plastic already in the presence of moistrue alone, indicating that water solvates polar groups of casein, thus increasing the flexibility of films. Elasticity of casein films is directly related to moisture content; an opposite relationship holds for hardness and water stability. Since the latter are fundamental characteristics of casein coatings, the use of casein as high-molecular binder is plausible only when hard, non-elastic coatings are desired.

Review of Work on Isotactic Polymers

By E. S. Krongauz & A. P. Suprun, "Uspekhi Khimii," Vol. 28, 9:1056-1083, September 1958.

An up-to-date review with bibliographic references covering literature between 1955 and 1958 on the following topics of isotactic polymerization: the preparation of stereo-regular polymers; mechanism and kinetics of stereospecific polymerization; isotactic polypropylene; bulk polymers; stereoisomeric polymers of diolefins; polyvinylchloride; isotactic polybutene; isotactic polystyrene; the synthesis of high-crystalline α-olefins with branched chains, and their properties; acetylene polymerization. The paper refers almost exclusively to the work done by Ziegler and Natta. In the U.S.S.R., Topchiev and his co-workers concentrated on the preparation of stereo-regular polymers. Recently, Topchiev and Krentsel' described new methods of polymerizing olefins into high-molecular compounds, and use of catalysts to that end. Topchiev and others also investigated the stereospecific polymerization using a variety of catalysts, and obtained isotactic polymers of propylene and other olefins. Rogovin and Kovarskaia investigated the properties of isotactic polypropylene.

Polyesters of Some Phosphinic Acids

By V. V. Korshak, I. A. Gribova, & M. A. Andreeva, "Investiia Akademii Nauk USSR, Otdelenie Khmicheskikh Nauk," 7:880-885, July 1958.

In 1957, the authors reported on the reactions of dichloranhydrides of alkyl- and arylphosphinic acids with glycols in the presence of hydrogen chloride-binding agents, resulting in the formation of polymer esters. On heating, these polyesters undergo thermal destruction and formation into monomeric cyclic esters, capable of polymerization. The polymers whose chains contain (in addition to phosphorus and oxygen) methylene groups are thick, viscous liquids; the introduction of various substitutes into their side chains does not alter their properties. The present paper reports on the synthesis of polymers containing aromatic radicals and phosphorus. Properties of polyesters, prepared from different phosphinic acids and hydroquinone, were found to depend on the initial acid. The nature of the substitute at the P atom exercises a marked influence. In contrast to the state of analogous polymers prepared from aliphatic glycols, the introduction of aromatic radicals into the polymer chain leads to the formation of hard products.

Polymers

By M. M. Koton, "Priroda," Vol. 47, 7:7-15, July 1958.

A popular-scientific treatment of the uses, composition, properties and preparation of polymers. Some recent developments are mentioned: the preparation of polymers stable at temperatures of 360°C and higher; work on metal-containing polymer chains with coordination bonds, permitting possibilities of synthesizing polymers with unusual properties. Low-temperature polymerization (−80°C), using gaseous boron trifluoride as catalyst, produced isoprene in the form of a hard, transparent polymer softening at 300°C. Ziegler and Natta catalysts are used to increase the thermostability of polymers. The physical laboratories of the Institute of High-Molecular Compounds in Leningrad currently concentrate on physical investigations of the structure and properties of macromolecules, and on the development of a theory permitting the production of tailored polymers.

Melt Viscosities of Low-Molecular Polycondensates

By M. Bohdanecky, J. Tamchyna, & V. Zvonar, "Chemicky Prumysl," Vol. 8, 7:382-384, July 1958.

The temperature dependence of the viscosity of unsaturated polyesters and of melts of lacquers based on phenol and p-tert-butylphenol was found to be described by the Vogel formula. At constant temperature, log η varies according to the molecular weight of the lacquers; with polyesters, log η varies according to the log of mol. weight.

Chemical Industry Production Figures

"Przemysl Chemiczny," Vol. 37, 5:373, May 1958.

A brief statement on the fulfilment of the Polish economic Plan by the chemical industry. The paint and varnish sector has manufactured in the first three months of 1958 a total of 13,700 tons of products; this exceeds the Plan quota by 3.2%. The sector produced a total of 14,100 tons of products in the last quarter of 1957. No breakdown of the figures is given.

CYCLIZED RUBBER

(*From page 52*)

improved drying properties are obtained when driers are used with cyclized rubber solutions alone or in combination with plasticizers. The use of driers is, therefore, superficial. The action of metallic driers carries only pure cyclized rubber films faster to an insoluble state. Larger amounts of driers cause viscosity increases and possible gelation of cyclized rubber solutions. Therefore, it is necessary to stay within certain limits when using driers:

Lead	1.0% or
Cobalt	0.1% or
Manganese	0.1%

In pure "Alpex-"alkyd resin combinations without plasticizer, cyclized rubber is said to improve the drying properties. Since driers do not increase the drying speed of "Alpex" as such, it would be wrong to use the conventional quantities of driers used in the formulation of alkyd resins for cyclized rubber-alkyd resin combinations. Such action would result in an over-dose of driers, which may cause disadvantages. The quantity of driers to be used in cyclized rubber is gaged by the oil content of the binder as in the formulation of oleoresinous varnishes.

Ordinarily no driers are needed for cyclized rubber-alkyd resin combinations if the ratio of cyclized rubber to alkyd resin calculated on a solids basis is not larger than 1:1½. This is especially noticeable when active pigments, which normally increase drying properties, are used. The use of such pigments, such as red lead, zinc oxide, chrome pigments, etc., may eliminate the use of driers in cyclized rubber-alkyd resin combinations used in 1:2 ratio in many instances.

For example, if 150 parts of alkyd resin are used with 100 parts of "Alpex," and if it is necessary to use driers to achieve a desired drying time, the following quantities of metal are recommended.

Lead	0.014%)	Such a drier combination
Cobalt	0.014%)	has given good results in
Manganese	0.003%)	practical applications.

As previously mentioned, no driers are needed in many cases. An over-dose of driers reduces the stability of cyclized rubber paints in the same manner as it does to other paints, and has a detrimental influence on aging and resistance of films. Inhibitors retard the cross-linking of cyclized rubber films. Even very small amounts influence this phenomenon strongly to such an extent that films retain their solubility over an extended period.

PIGMENTATION

Principally, cyclized rubber is compatible with most of the well-known pigments used in the paint and printing ink industries. Its chemically neutral character makes cyclized rubber compatible with reactive pigments. This eliminates the concern that thickening through soap formation may occur. Only extreme pigment concentrations may cause viscosity increases with some iron, lead or manganese containing pigments. This refers especially to high managanese containing umbra and iron oxide black, which should only be used for tinting purposes, just

like chrome yellow and chrome green. The addition of driers should be eliminated if paints containing lead pigments are used. Through the use of anti-oxidants, sufficient storage stability is obtained when pigments of high lead content are used.

Calculating the pigmentation on a volume basis (20% vol. pigment in the dry film), cyclized rubber paints without plasticizers show a viscosity pattern for the various pigments used, as outlined in Table VII. All paints were reduced with mineral spirits to a viscosity of 70-80 sec. #4 Ford Cup at 20° C. The paints did not contain further additions. For storage purposes, glass bottles were used.

After a storage time of five months, the settled white lead could not be stirred back into the vehicle. Through the use of anti-settling agents, these difficulties can be eliminated. It may also be mentioned that the highly pigmented vehicles causing strong increases of viscosity, as mentioned above, are of no practical value, and such pigmentations were only used for experimental purposes. Figure 5 demonstrates the high pigmentability of "Alpex." The results of the experiments show the degree of pigmentation and resulting gloss measurements, determined with a 60° Gardner glossmeter. These values, as shown in both diagrams, are in relation to the pigment volume and the pigment weight concentration respectively.

The results give a clear picture of the excellent binding properties of cyclized rubber with titanium dioxide and zinc oxide. The gloss values are the most favorable with titanium dioxide. When 300 parts by weight of TiO_2 are used to 100 parts of binder, a semi-gloss or silk sheen is still obtained.

An Alpex-alkyd resin combination (1:1) is equal to an alkyd resin or a varnish as far as pigment binding properties are concerned. The relation of pigmentation and chemical resistance of "Alpex" films will be discussed in a future instalment.

LACQUER

(*From page 29*)

ingredients in the lacquer vehicle. By using rich, active solvents and by omitting the diluent from a typical solvent combination, high solids can be obtained in aerosol formulations containing the propellant as the sole diluent.

A useful solvent combination which performs well is an 85:5:5:5 mixture of methyl isobutyl ketone: butyl Cellosolve: isopropanol: ethanol. With such a combination, compatibility between the base lacquer and propellant gas was obtained.

Another important consideration in formulating aerosol lacquers is viscosity. This property is controlled by the internal pressure in the aerosol can. I.C.C. limits allow the can to be filled to only 40 p.s.i. at 72°F. Most commercial cans average around 35 to 38 p.s.i. To be sprayable at this pressure a No. 4 cup viscosity of no more than 25 seconds is necessary. The optimum viscosity seems to be in 18 to 20 sec. range. Solids usually run from 15 to 20% for pigmented lacquers. Clear lacquers will be slightly lower than pigmented lacquers. Formulations for clear and pigmented lacquers are given in Table II

The main industrial use of aerosol nitrocellulose lacquers is a touch up tool for furniture and appliance manufacturers and on-the-spot touch-up of automatic vending machines, gasoline pumps, etc. In an around the home aerosol lacquers are finding use in painting outdoor furniture, kitchen cabinets and in touch up jobs.

•

A Statement

On page 30 of our January issue under the heading, "Extenders" mention was made of Minerals and Chemicals Corp. in connection with surface modified silicate pigments. In order to avoid any misunderstanding we wish to advise that other suppliers of this particular extender include Georgia-Kaolin Co., J. M. Huber Corp., and Southern Clays, Inc.

(*From page 43*)

to the customers' specifications, or fill with the customer's own coatings.

Components of the package include the can itself, the valve and cap and the propellant. Costs of these vary a fraction of a cent, but generally speaking, run about 13 cents for the propellant, six cents for the can, and three and a half cents for the valve and cap—a total of about 22½ cents for the package. Since nearly all aerosol paints are paper-labeled, the manufacturer can add anywhere from a half cent to two cents, depending on his tastes, for the label. That means the package alone costs about 23-25 cents.

Loading Costs

Coating manufacturers can figure loading costs at about 5-6 cents per unit, depending on the volume desired.

Once the product is packaged, the contract loader, at the customer's wishes, either will ship the product back to the manufacturer for self-distribution, ship it into a warehouse for inventory, or drop ship directly to the retailer.

The cost of propellant raises many eyebrows, since it represents more than half the cost of the package. Fluorocarbons, the propellants used for paints, are the most expensive on the market. The reason for its use in paint containers is simple—it does the best job. There are a number of other propellants on the market—and they're used for a number of different products—but they don't have enough pressure to achieve the proper spray pattern for paints.

Aerosol paint cans are filled in this manner—the paint product is poured into the can (filling about half the container); the propellant is cooled to about 40° below zero (a temperature at which the propellant is in a liquid state) and then poured in on top of the product, filling the can. The valve cap then is crimped into place on top of the can and the package allowed to return to room temperature where the propellant again becomes gaseous, producing pressure inside the can.

Not all the gas returns to a gaseous state, however,—and for good reason. As the paint is used, more of the liquid gas vaporizes, filling the empty space in the can with more gas and thus keeping a constant pressure on the paint.

This permits total use of the product by the consumer and means that the user can count on equal spray pressure whether the can is full or nearly empty.

Ideal temperature for using a can of pressure-packed paint is about 70°F. As the temperature rises, the pressure inside the can increases. Government regulation provides for each can to be heated to 130°F. to guarantee safety on the part of the consumer. Directions on the can warn against storing cans in temperatures above 120°F.

Manufacturers and suppliers alike seem to be in agreement that the aerosol paint industry is destined to grow year by year and that eventually every major paint manufacturer will have a line of the pressure products.

The public is turning more and more to aerosol paints for the "thousand and one" jobs around the house that require only a limited amount of paint. In fact, the trend to aerosols is so great, that we at Canco think the half-pint and quarter-pint conventional cans of paint, requiring a brush to apply, may very nearly disappear from the market withing a year or so.

Better packages now being produced have been perfected to the point where, despite their complexity, they offer the consumer no more difficulty in use than the more conventional can of paint. Cleaning, too, has become simple. New valves in use today provide for the consumer to merely flip the can upside down and trigger the valve until clear gas is discharged from the can, indicating that the nozzle is completely clear of paint.

NEWS

NEWS OF COMPANIES, ASSOCIATIONS
TECHNICAL GROUPS
ITEMS OF GENERAL INTEREST

Purdue U. Schedules Technical Course

Purdue University, Lafayette, Indiana has announced a second short course in paint and varnish technology commencing March 30, 1958. The tentative program is as follows:

I. **New Developments in the Paint and Varnish Industry**
   - A. Polyester films
   - B. Polyurethane films
   - C. Epoxy resins
   - D. New developments in alkyd resins
   - E. Fluorocarbon films
   - F. Acrylics and related materials
   - G. New developments in film curing
   - H. Latex Systems

II. **Testing of and Experimentation with Coatings Materials**
   - A. Experimental film-coating methods
   - B. Physical testing of films
   - C. Chemical testing of films
   - D. Use testing of films
   - E. Rheology of fluids used in the industry
   - F. Analysis of materials used in the industry

III. **Engineering in the Industry**
   - A. Production planning and scheduling
   - B. Developments in dispersion
     1. Theory
     2. Equipment and techniques
   - C. Potentialities for continous processing in the industry
   - D. Statistical approach to quality control and specifications

IV. **Economics in the Industry**
   - A. Inventory policy and control
   - B. Potentialities for automation in the industry
   - C. Panel discussion: costing and pricing policies in the industry
   - D. Banquet speech: technical and economic trends in the industry

•

ADM Amide Production

Archer-Daniels-Midland Company has announced that it is producing amides, fatty nitrogen chemicals with many industrial uses in commercial quantity.

ADM said that its Wyandotte, Michigan, chemical plant is manufacturing coco, hydrogenated tallow, stearyl, erucyl and oleyl amides from the fatty acids which the plant also produces.

The ADM amides, available through the company's development department, are the newest members of the company's line of fatty nitrogen compounds. These products are marketed under the trade name Adogen.

Tall Oil Contest

Prizes were recently awarded in the Albert Scharwachter Tall Oil Contest, it has been announced.

A prize of $250 was presented to Dr. J. Rinse of Chemical Research Associates, Inc., Bernardsville, N. J., for his paper entitled "Aluminum Tallate Polymers."

Another prize of $100 was won jointly by Dr. E. E. McSweeney and Mr. Russell D. Bitting of the Battelle Memorial Institute, Columbus, Ohio, for their paper entitled "High Softening Point Maleic Modified Tall Oil Rosin Glycerol Esters."

•

Renfrew Elected Chairman

Dr. Malcolm M. Renfrew, professor of chemistry and head of the department of physical sciences at the University of Idaho, has been elected chairman of the American Chemical Society's division of chemical marketing and economics for 1959. He succeeds Dr. Ambrose Whitney of W. R. Grace & Co.

John J. Glover of the Jefferson Chemical Company, Inc., Houston, Tex., was named chairman-elect of the division, and John W. Slaton of the Atlas Powder Company, Wilmington, Del., was chosen as secretary-treasurer.

Reichhold Holds Epotuf Epoxy Resins Symposium

A fund of information on epoxy resins was presented to a gathering of surface-coating formulators attending the first symposium on Epotuf epoxy resins held by Reichhold Chemicals, Inc. The recent meeting took place at the RCI Plasticenter in Elizabeth, N. J.

A general review of epoxy characteristics and chemistry provided the background for specific data on surface coating formulations using RCI's Epotuf epoxy resins. Reichhold Chemicals has done considerable research, especially during the past year, on the uses of epoxies in coatings, enamels, protective finishes and patching compounds. The firm has developed basic formulations for all types of epoxy systems including phenolic, urea, amine and ester combinations with the various Epotuf resins.

The symposium was so well received that the well-known resin producing company plans to hold others at Elizabeth and other strategic points throughout the country. A special Epotuf Formulary is being prepared for distribution to those attending the symposiums and to others in the surface coating industry.

Information on future meetings and on the Epotuf Formulary may be obtained by writing to C. A. Knauss, Vice-President, Surface Coating Resin Sales, Reichhold Chemicals, Inc., Dept. PVP, RCI Building, White Plains, N. Y.

SPECIAL BLEND PAINT: Painter-team is shown applying Gelvatex special formulated interior vinyl on ceilings of $5,000,000 Del Amo Broadway Department Store under construction in Torrance, Calif. The paint solved a unique problem caused by sand finish plaster on ceilings—high reflectivity and flat tone appearance were required from the paint. The Gelvatex product fulfilled both needs, according to the painting contractor.

NEWS

Wormald Gives Pigment Talk to New York Club

George Wormald of the Du Pont Co. delivered a talk on "Monastral" Reds at the January 8 meeting of the New York Paint & Varnish Production Club.

With the aid of panels, George Wormald demonstrates characteristics of "Monastral" Reds in various paint systems.

The following properties of "Monastral" Reds, a new family of three red pigments, were outlined by Mr. Wormald:

1. Excellent brightness and intensity.
2. Excellent lightfastness (resistance to color change on outdoor exposure, particularly in pastels).
3. Excellent heat resistance (resistance to color change when subjected to high temperatures).
4. Excellent chemical resistance (to soap, alkali, and acid).
5. Excellent "bleed" resistance (color does not stain adjacent areas).
6. Excellent blending properties with other pigments.

Mr. Wormald discussed automotive and industrial finishes. He demonstrated the unique color effects possible with the "Monastral" Reds by showing panels of various shades. He pointed out, by use of these panels, that these red pigments display excellent lightfastness in exterior water emulsion paints, particularly in the pastel shades.

Last year, Du Pont announced a family of three distinctively different pigment colors, developed after 10 years of research, from derivatives of the linear quinacridone structure: a dark transparent, blue-shade toner ("Monastral" Red B), a yellow-shade red toner ("Monastral" Red Y), and a dark, transparent red-shade violet toner ("Monastral" Violet R).

Before Mr. Wormald's talk, Dr. Soff read a letter of resignation from Grant Schleicher who is regretfully reducing his activities to spare his health. Because of Mr. Schleicher's long and valued service to the club, he was nominated for honory membership.

Louis Agre Passes

Louis Agre, 47 representing H. Kohnstamm & Co., Inc., in the metropolitan New York and Northern New Jersey territory recently died of a heart attack.

Mr. Agre, a graduate in chemical engineering from the University of Pennsylvania, taught chemistry for a year before he joined the chemical staff of Industrial Sales Corp. Subsequently he became a sales director of Texas Eastern Oil Distributors and had joined the Kohnstamm organization approximately one year ago.

Fire Retardant Paint Successfully Exhibited

Recently, a unique demonstration, involving a type of fire retardant paint, was held at the Pimlico Racetrack, Baltimore, Md. The paint was developed and manufactured by the Baltimore Paint & Chemical Corp., under the trade name of SAF (stops all fires).

The critical test was conducted on two models of typical racetrack barns, one painted with the fire retardant. Both units were filled with dry straw and ignited simultaneously. The conventionally painted model was rapidly destroyed in a roaring fire, and in fifteen minutes was consumed to the ground.

The barn which was protected by SAF fire retardant paint showed no damage at all. The paint proved an effective shield against the intense heat and fierce flames. The straw had completely burned itself out without igniting or even charring the structure itself.

According to reports, the new material had just recently been tested by Underwriters' Laboratories, and received the highest flamespread classification ratings ever achieved by a fire retardant paint. The SAF, Type 303 Coating, will be listed as having a rating of 15 when applied in one coat, and a rating of 10 when over-coated with the Type 202 Gloss Finish. These ratings compare with a ¾" to 1" layer of sprayed-on asbestos fiber and are considerably better than, for instance, the ratings for impregnated lumber.

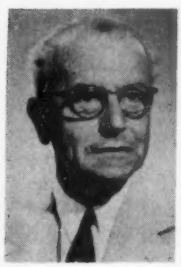
The fire retardant paint is of the intumescent type, which means that when exposed to fire or extreme heat, it developes into an imprevious, foam-like mat, which effectively and completely insulates the surface against fire.

Model barn, on right, was painted with SAF fire restardant paint. Both were filled with straw and ignited. The unprotected barn burst into a roaring fire.

NEWS

Van Ameringen Merges With Polak & Schwarz

Announcement was made recently by A. L. van Ameringen, chairman of the fifty-year-old firm, van Ameringen-Haebler, Inc. of New York, and C. C. Brummer, managing director of the seventy-year-old Polak & Schwarz N. V. of Zaandam, Holland, that the two companies merged their operations as of December 31, 1958.



A. L. van Ameringen

C. C. Brummer

A parent company to be known as International Flavors & Fragrances Inc., with headquarters in New York, provides an organization of first-rank size and broad international scope. Through its wholly-owned manufacturing subsidiaries in fifteen countries, International Flavors & Fragrances will supply, on a world-wide basis, fragrance materials for use in various products.

The van Ameringen-Haebler and Polak & Schwarz organizations will retain their identities as divisions of the parent company. Each will continue to serve its customers as in the past but on a greatly expanded basis.

•

1959 Society Officers

Dr. Allen L. Alexander, head of the protective coatings branch, Naval Research Laboratory, Washington, D. C., has been elected chairman of the American Chemical Society's Division of Paint, Plastics and Printing Ink Chemistry for 1959. He succeeds Professor L. Reed Brantley of Occidental College, Los Angeles.

Walter A. Henson of The Dow Chemical Company, Midland, Mich., was named chairman-elect of the ACS division, and Dr. Edward G. Bobalek of the Case Institute of Technology, Cleveland, was chosen vice chairman. E. R. Mueller of Battelle Memorial Institute, Columbus, was re-elected secretary-treasurer.

Representing the division of the ACS Council will be John K. Wise of the U. S. Gypsum Company, Chicago, and Dr. Ellsworth E. McSweeney, also of Battelle Memorial Institute. Alternate councilors are Dr. Walter K. Asbeck, Union Carbide Chemicals Company, South Charleston, W. Va., and Dr. Alexander.

•

Carbide Buys Plant

Morse G. Dial, chairman of the board, Union Carbide Corp., has announced that the corporation has exercised its option to purchase from Amoco Chemicals Corp., the utilizable facilities which remain on the 306-acre tract at Brownsville, Texas, site of the processing plant formerly operated by Amoco.

The option also includes the 42-mile Weslaco-Brownsville natural gas pipeline. Union Carbide is negotiating a long-term lease with the Brownsville Navigation District (Port of Brownsville) for the Brownsville tract.

Engineering studies will be made for additions and revisions at the site. Utilization of these facilities will be deferred for this reason and also will depend upon completion of satisfactory arrangements for fuel gas and raw material supply. Operations at Brownsville will be carried on by Union Carbide Chemicals Company and Union Carbide Olefins Company.

•

N.Y.U. Offers Courses In Surface Technology

New York University, in cooperation with the New York Paint & Varnish Production Club, is offering the following courses which will begin in February:

Fundamentals of Paint, Varnish, and Lacquer Technology. Fee: $40.00.
Basic principles of the manufacture, formulation, and application of paint, varnish, lacquer, and other organic coatings. Representative topics include: raw materials used for organic coatings—pigments, resins, oils, driers, solvents, lacquer raw materials, rubber based products; formulation of organic coatings—industrial, trade sales, architectural, maintenance coatings. Elias Singer, B. S. Technical Director, Troy Chemical Company, New York. Tuesday 8.10-9.55, February 3-May 19.

Seminar: New Developments in Organic Finishes. Fee: $45.00.
Consideration of recent developments in polymer chemistry as they affect formulation, performance, and uses of organic surface coatings. Discusses new raw materials and finishes—epoxys, urethane coating, organosols and plasticols, gloss emulsions, new types of lacquers, etc. Sidney Lauren, B.S. (Chem.), Chemist, Finishes Section, John Manville Research Center, Manville, New Jersey and Elias Singer. Wednesday, 8.10-9.55, February 4-May 20.

Additional information about these courses may be obtained by writing Herman Grau, Coordinator, Technical Studies, in care of the university, or calling Spring 7-2000, Extension 292, in New York.

CLUB OFFICERS: Newly elected officers and executive committee of the Golden Gate Paint, Varnish and Lacquer Association: (front, seated), left to right, executive secretary, Geo. E. S. Thompson; president, B. King Haugner; vice president, D. Ray Garrett; secretary-treasurer, Jim Robertson; (back) executive committee members: John A. Gast; Tom Hardeman; John Lathe, Jr.; and T. Ed Wilde.

NEWS

Chi. Tribune Supplement To Promote Paint Sales

Creation of more favorable consumer attitudes toward home painting is the aim of a special newspaper supplement to be published Sunday, April 26, 1959, by the Chicago Tribune.

During the past ten years, the paint industry's share of the Chicago consumer's dollar has been dwindling, reports W. C. Kurz, Tribune advertising manager. Even though effective buying income of metropolitan Chicago families has increased 125 per cent during this period, he says, consumer paint sales have risen only 30 per cent.

To offer Chicago consumers additional motivation for painting during 1959, the Tribune's "Paint Up Time" supplement will remind them of the enjoyment, ease and satisfaction of home painting.

Mr. Kurz said the section will be timed to coincide with Chicago's annual spring clean-up period, which begins April 25. The section will also serve as the official supplement of the Chicago Paint, Varnish and Lacquer Association.

Contents will include features and photos accenting the vital and desirable role of paint in maintaining a beautiful and stylish home. This theme will be dramatized in a full color cover illustration, and will be carried throughout the supplement. Also included will be how-to-do-it articles, together with complete information about the improved paint products available today.

Conference Series In Paint Technology

The special courses division of Newark College of Engineering in cooperation with the educational committees of the New York Paint, Varnish and Lacquer Association and the New York Paint and Varnish Production Club has announced the opening of registration for two conference series in paint technology which will begin in February, 1959, under the supervision of Professor Frederick W. Bauder.

"The Technology of Paint and Lacquer," will present the basic principles and mechanisms of film formation, properties, functions, and raw materials used in protective coatings and pigment relations. A previous course in general chemistry, or equivalent experience in the field, is required. The topics scheduled for discussion during this series include: Drying Oils, Synthetic Resins, White Pigments, and High Polymers.

The conference series on "The Chemistry of Synthetic Resins and High Polymers," will feature lectures developing the chemistry of resins and high polymers from an experimental phase to the latest stage. Chemical structure, development, properties, uses and comparative values as a coating material will be discussed. A working knowledge of organic chemistry is essential.

Both series will feature guest speakers from industry who have achieved recognition in their various fields. Classes will begin February 18, and thereafter on Wednesday evenings from 7:30—9:30 P. M.

Registration can now be made by contacting the special courses division of Newark College of Engineering, Newark, N. J.

PAST PRESIDENTS: The Chicago Paint, Varnish & Lacquer Association payed tribute to its past presidents at a luncheon in their honor held recently in Chicago. Eight past presidents and nine of the present officers and executive committee attended the luncheon and renewed old acquaintances.

Feb. 19-20. Annual Divisional Conference of the Protective Coatings Subject Division, Chemical Institute of Canada, Toronto and Montreal, on Respective Dates.

Mar. 2. Fourth Technical Symposium of the Louisville Paint & Varnish Production Club, Sheraton Hotel, Louisville.

Mar. 18-20. Annual Meeting of the Southern Paint & Varnish Production Club, Buena Vista Hotel, Biloxi, Miss.

PRODUCTION CLUB MEETINGS

Balitmore, 2nd Friday, Park Plaza Hotel.
Chicago, 1st Monday, Furniture Mart.
C.D.I.C., 2nd Monday.
Cincinnati — Oct., Dec., Mar., May, Hotel Alms.
Dayton — Nov., Feb., April, Suttmilers.
Columbus — Jan., June, Sept., Fort Hayes Hotel.
Cleveland, 3rd Friday, Cleveland Engineering & Scientific Center.
Dallas, 1st Thursday after 2nd Monday, Melrose Hotel.
Detroit, 4th Tuesday, Rackham Building.
Golden Gate, 3rd Monday, Sabella's Restaurant, San Francisco.
Houston, Monday prior 2nd Tuesday, Rams Club.
Kansas City, 2nd Thursday, Pickwick Hotel.
Los Angeles, 2nd Wednesday, Scully's Cafe.
Louisville, 3rd Wednesday, Seelbach Hotel.
Montreal, 1st Wednesday, Queen's Hotel.
New England, 3rd Thursday, University Club, Boston.
New York, 1st Thursday Brass Rail, 100 Park Ave.
Northwestern, 1st Friday, St. Paul Town and Country Club.
Pacific Northwest, 3rd Thursday, Washington Athletic Club, Seattle, Wash.
Philadelphia, 3rd Wednesday, Philadelphia Rifle Club.
Pittsburgh, 1st Monday, Gateway Plaza, Bldg. 2.
Rocky Mountain, 2nd Monday, Republican Club, Denver, Colo.
St. Louis, 3rd Tuesday, Kings-Way Hotel.
Southern, Annual Meetings Only.
Toronto, 3rd Monday, Oak Room, Union Station.
Western New York, 1st Monday, 40-8 Club Buffalo.

PERSONNEL CHANGES

AMERICAN CYANAMID

R. A. Hoekelman has been appointed director of customer relations, a newly-created post; **L.J. Francisco** has been named general manager; and **W.D. Holland,** has become assistant general manager, plastics and resins division, it has been announced.

R. A. Hoekelman

Mr. Hoekelman was formerly general manager, plastics and resins division, and Mr. Francisco, assistant general manager. Mr. Holland was formerly assistant general manager, commercial development division.

Mr. Hoekelman rejoined the firm in 1941 as executive accountant, having resigned in 1934 to become associated with a New Jersey chemical company. Later he served as comptroller and assistant treasurer. He was appointed assistant general manager of the plastics and resins division in 1952, and was promoted to general manager in 1953.

L. J. Francisco

W. D. Holland

Prior to his appointment as assistant general manager of the plastics and resins division Mr. Francisco had spent his entire business career with Formica Corporation. He joined that company in 1924, in Cincinnati, Ohio. His appointment to the Chicago, Illinois, sales office came the next year, and in 1941 he was promoted to district sales manager, New York. In 1951 he returned to the company's headquarters in Cincinnati as vice president of sales and advertising. He continued in that position when the company became a subsidiary of the firm in 1956.

Mr. Holland joined the firm in 1946, and has been manager of manufacturing of the plastics and resins division. Prior, he was production manager of the company's agricultural chemical division, and earlier served in various administrative capacities.

UNION CARBIDE CHEMICALS

Norman R. Cox, Dr. Robert G. Kelso, and **Dr. Fred W. Stone** have been appointed group leaders in the development department at South Charleston, West Virginia.

Mr. Cox will work on process development on a pilot-plant scale, and Drs. Kelso and Stone will work on process and product development.

Mr. Cox joined the firm after receiving a B. S. degree in chemical engineering from Ohio State University in 1958.

Dr. Kelso attended Juniata College where he received a B. S. degree in chemistry in 1945. He joined the company after receiving a Ph. D. degree in chemistry from Ohio State.

Dr. Stone received a B. S. degree in chemistry from the University of Illinois in 1950, and M. S. and Ph. D. degrees in organic chemistry from the University of Pennsylvania in 1954. He joined the firm after receiving his Ph. D. degree.

Dr. John R. Nazy and **Ronald A. Thursack** have joined the development department, it has also been announced.

Dr. Nazy received a Ph. D. degree in organic chemistry in 1958 from Northwestern University.

Mr. Thursack will receive an M. S. degree in physical chemistry early in 1959 from the University of Chicago

DEWEY & ALMY

Harry N. Lowell has joined the organic chemicals sales department, it has been announced. He will assist **Charles E. Brookes,** sales manager, in special projects.

H. N. Lowell

Mr. Lowell was formerly a member of the marketing research department, specializing in organic chemicals. He has also served in the commercial research department, Bethlehem Steel Company.

He received a B. S. in business administration from the Massachusetts Institute of Technology in 1951.

DU PONT

Walter F. H. Mattlage, assistant general manager of the fabrics and finishes department, has been named general manager, it has been announced.

Mr. Mattlage succeeds **E. S. Nickerson** who has retired as general manager after a career of 43 years.

Mr. Mattlage joined Du Pont in 1928 as a mechanical engineer at the Newburgh, N. Y., coated fabrics plant. He was appointed production superintendent of the Newburgh plant in 1937, and in 1941 was transferred to Remington Arms Company, a firm subsidiary.

From 1950 to 1952, he was vice president of Rem-Cru Titanium, Inc., a joint subsidiary of Remington Arms and Crucible Steel Company of America, engaged in research, development, and fabrication of titanium metal. Mr. Mattlage was appointed manager of the fabrics division in 1952, and was promoted to assistant general manager of the fabrics and finishes department in 1953.

CARLISLE CHEMICAL WORKS

Dr. I. Heckenbleikner has been appointed research director, it has been announced.

I. Heckenbleikner

Dr. Heckenbleikner's experience includes work in phosphorus, nitrogen, fluorine, organo-metallic and general synthetic organic chemistry. He is a graduate of Davidson College, Davidson, N. C., and received his Doctorate in Organic Chemistry at M.I.T. in 1937. Most recently, he was research director of Shea Chemical Corp. and before that in the Stamford Research Laboratories of American Cyanamid.

He will direct the research activities of various products in the fields of paint and plastics.

ARCHER-DANIELS-MIDLAND

Promotion of three members of the organization's Minneapolis research staff has been announced.

James R. Blegen has been appointed manager of technical service for coatings and resins. He will supervise the Minneapolis, Newark, New Jersey, and Los Angeles, California technical service laboratories.

Robert A. Boller has been named group leader, coatings and resins research and development, with responsibilities for both water-thinned and conventional type resins used in protective coatings.

Owen E. Paukner has been appointed manager of the Minneapolis technical service laboratory for coatings materials and resins.

Mr. Blegen, who joined the firm in 1956 from General Electric Company, has been manager of industrial resin sales service. A graduate of North Dakota State College with a bachelor's degree in chemistry, Mr. Blegen also previously was associated with Firestone Tire and Rubber Company and General Paint Corporation in research positions and was a research assistant at the University of Illinois.

Mr. Boller, who holds a master's degree in chemical engineering from the University of Minnesota, has been project leader in water-thinned vehicle development in the research center. He joined the company in 1948.

Mr. Paukner, formerly manager of the trade sales section in the Minneapolis sales service laboratory, has been with the company since 1942. He has a bachelor's degree in chemical engineering from the University of Minnesota.

DUPLI-COLOR PRODUCTS

Wellington F. Berghoff has joined the firm, it has been announced.

Mr. Berghoff will be in charge of research, product development, and quality control of all organic finishes.

For the last four years he was laboratory supervisor for Ford Motor Company, in charge of development, application and quality control of paint and applied similar products. Previously, for three years, he held a similar position with Packard Motor Co.

MARTIN-SENOUR

Phil E. Needham has been named manager of the Chicago sales division, it has been announced.

Mr. Needham has been a company sales representative in Iowa. He previously was associated with the Standard Paint and Glass Company, Des Moines.

CLASSIFIED ADVERTISEMENTS

Rates: $.20 per word, except those seeking employment, for which rate is $.10 per word. Minimum: ten words. Address all replies to Box Number, c/o Paint and Varnish Production, 855 Avenue of the Americas, New York 1, New York.

PEBBLE MILLS

2—1000 gal. mills, each with direct drive, 3 phase motor & inching mechanism (6'x10' each).
1—750 gal. mill, chain drive (6'x8').
1—500 gal. mill, chain drive (6'x6').
All in excellent condition, can be seen running—priced to sell.

Girard Paint & Varnish Mfg. Co.
2600 N. 5th Street
Philadelphia 33, Pa.

ADVERTISERS' INDEX

WEATHER-RESISTANT BUTYRATE LACQUERS PRESERVE THE NATURAL BEAUTY OF ALUMINUM

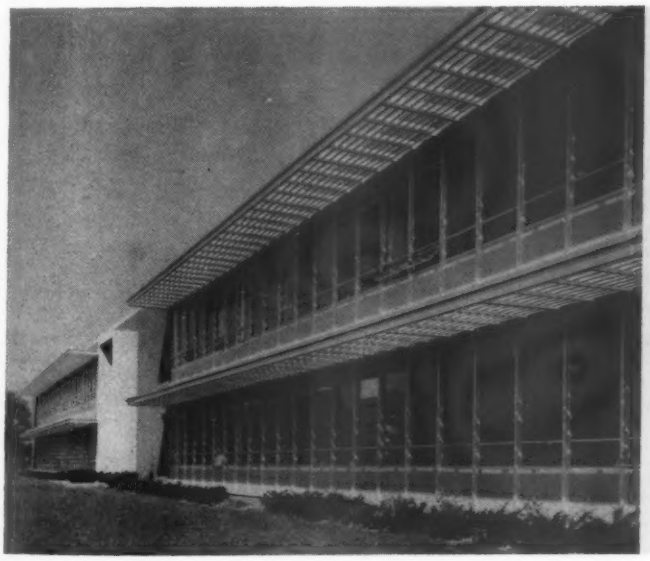
Here's welcome news for architects and engineers.

Clear, colorless Butyrate lacquer—a new type of coating—provides lasting weather protection for aluminum.

Butyrate lacquers form tough, tenacious coatings that won't turn yellow, even under prolonged exposure to sunlight. They withstand oxidation and discoloring...have excellent flexibility and strength...and are little affected by salt spray, water immersion or temperature change.

Cleaning and maintenance costs are reduced to a minimum, too, when outdoor aluminum products are coated with Butyrate lacquers. Apart from an occasional hosing in areas of extreme contamination, rain alone will keep the aluminum surface gleaming.

This combination of features makes Butyrate lacquers particularly advantageous for use on aluminum curtain walls, siding, spandrels, louvers, solar canopies and architectural trim and hardware.



With the increasing use of aluminum products outdoors, the market for Butyrate protective coatings is growing rapidly. Take advantage of this opportunity for new business by offering lacquers made from Eastman Half-Second Butyrate.

An informative 15-minute, 16mm. sound color film has been produced especially for viewing by those interested in this market.

North Central High School, Indianapolis, controls sunlight and reduces summertime heat transmission with aluminum sun cornices made by O. O. McKinley Co., Inc., of Indianapolis, Indiana. The satin finish of the aluminum surface is protected from weathering by a clear, colorless Butyrate lacquer.

The finest lacquers for aluminum are made with

HALF SECOND BUTYRATE

an Eastman film former

SALES OFFICES: Eastman Chemical Products, Inc., Kingsport, Tennessee; New York City; Atlanta; Framingham, Massachusetts; Cincinnati; Cleveland; Chicago; Greensboro, North Carolina; St. Louis; Houston. **West Coast: Wilson Meyer Co.,** San Francisco; Los Angeles; Portland; Salt Lake City; Seattle.

LACQUER FORMULATORS!

Get the complete story on this new type of protective coating for outdoor aluminum.

(1) Send for Eastman's catalog on Butyrate lacquer. It tells you where this new lacquer has proved particularly successful and why it is so effective in preserving aluminum surfaces.

(2) Send for 16mm. sound color film. Please indicate the date you plan to show the film and an alternate date.

TROY

TROY Est. 1870

DUPLEX DISPERSER*

Produces Finished Product in One Operation

Compact unit combines powerful disperser head with rugged diamond-shaped agitator to produce finished batches *without further milling* for the majority of inks and paints. Modern design gives proportional hydraulic shear, kinetic impingement and mulling action for better wetting, improved color dispersion, and uniform blending.
Send samples for trial processing.

*Trademark—Patent Pending

COLLOID MILL

With Triple Action Design

Utilizes three zones of action — at upper face of rotor, between peripheral surface of rotor and housing, and between under face of rotor and housing — for better emulsions and finer dispersions. Unit design prevents aeration of materials. Clearances adjustable while unit is in operation by calibrated adjusting ring.

ROLLER MILL

With *One Point* Adjustment "Floating Roll" Principle

For high speed precision-controlled dispersion and grinding of ink, paint, coatings, and similar products. Floating Roll principle minimizes roll distortion gives maximum grinding surface. Exclusive one-point adjustment speeds clean-up time and provides quick, accurate resetting of rolls.

Write TODAY for new 1958 TROY Processing Equipment Catalog and name of your nearest dealer.

TROY **TROY** Engine & Machine Co.

1-29 Parsons Street, Troy, Pennsylvania Tel: Troy 32

Send Sample of Your Material for Trial Processing. No Obligation.